AGRICULTURAL *Chemicals*

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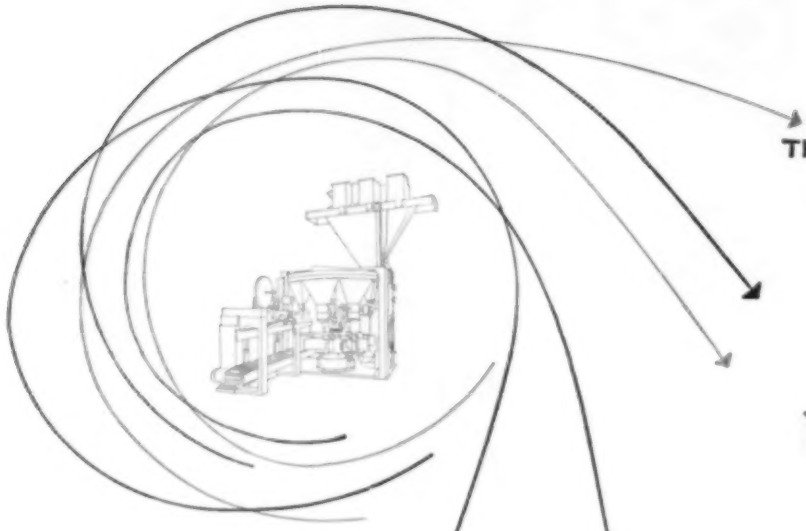
- Aerosol Insecticides
- Ammonium Sulfate . . . A Review
- At The National Garden Show
- Conveyor Loading
- 1957 Annual Index
- Liquid Fertilizer Association Meeting

December 1957



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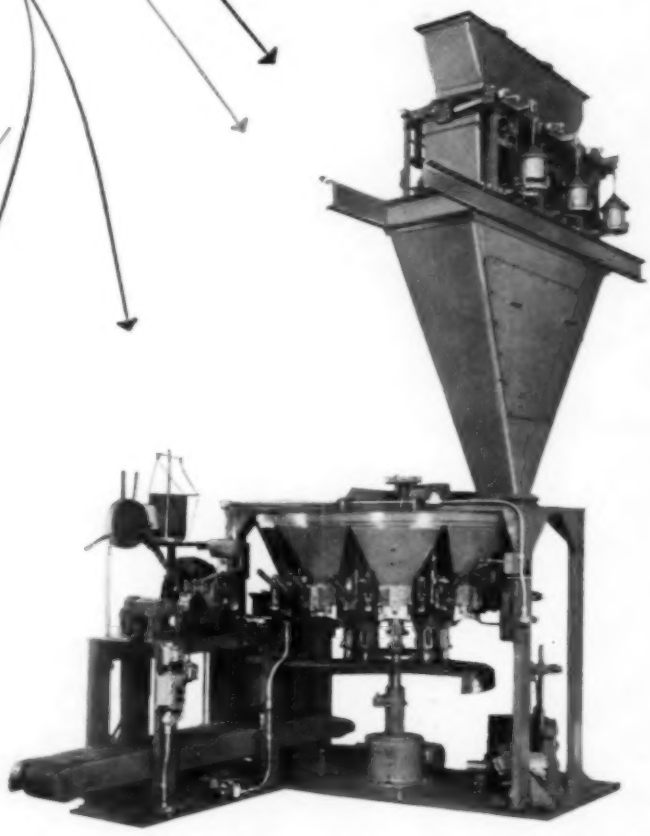

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This Month's Cover

Prize winning displays in Velsicol's $10,000 Chlordane "Show and Sell" contest directed to lawn and garden supply retailers. More than 2000 entrants competed for the $2,000 first prize, which was won by East Bay Nursery, Berkeley, California. Other regional and national prizes made up the $10,000.00 total of prizes.

Vol. 12, No. 12 December, 1957

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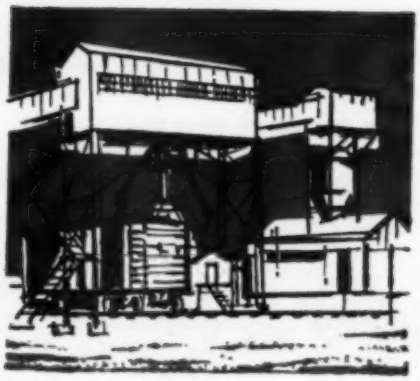

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Industry Meeting Calendar

Dec. 2-5—Entomological Society of America. National meeting jointly with Cotton States ESA. Hotel Peabody, Memphis, Tenn.

Dec. 2-5—Exposition of Chemical Industries. New York Coliseum, N. Y. C.

Dec. 4-6—Soil Science Society of Florida. University of Florida, Gainesville.

Dec. 3-4—Iowa State College Fertilizer Manufacturers' Conference and Fertilizer Dealers' Short Course. Ames, Iowa.

Dec. 9-12 — Chemical Specialties Manufacturers Association. Hollywood Beach Hotel, Hollywood, Fla.

Dec. 9-12—Vegetable Growers Association of America. Jung Hotel, New Orleans.

Dec. 10-12 — North Central Weed Control Conference, Hotel Savory, Des Moines, Iowa.

Dec. 11-13—Agricultural Ammonia Institute. Hotel Marion, Little Rock, Ark.

Dec. 12-13—Beltwide Production Conference, including the Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.

Dec. 12-13—Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.

Dec. 26—26th Exposition of Chemical Industries at the Coliseum in New York.

Jan. 4-5—Texas Fertilizer Conference, Texas A&M, College Station, Texas.

Jan. 8-10—Northeastern Weed Control Conference, Hotel New Yorker, N.Y.C.

Jan. 13-15—1958 Weed Society of America and Southern Weed Conference, Peabody Hotel, Memphis, Tenn.

Jan. 14-15—Georgia Plant Food Educational Society, Univ. of Georgia, Athens, Ga.

Jan. 21-22—North Carolina Pesticide School, N. C. State College, Raleigh.

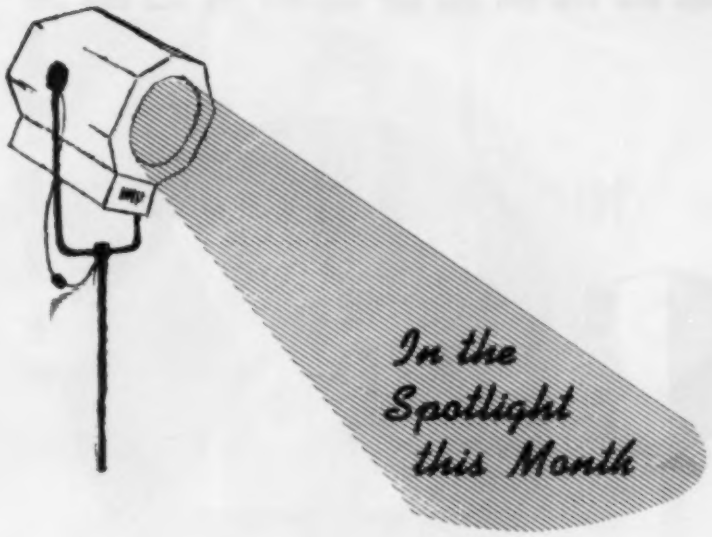
Jan. 20-21—Alabama Association for Control of Economic Pests. State Coliseum, Montgomery, Ala.

Jan. 21-23—California Weed Conference, San Jose, Calif.

Jan. 22-23—Northwest Agricultural Chemicals Industry Conference, Hotel Benson, Portland, Ore.

Jan. 23-24—10th Illinois Spray Operators' School, University of Illinois, Urbana.

Feb. 10-11—Southwestern Branch, ESA, Annual Meeting, Shamrock Hilton Hotel, Houston, Tex.



- **Aerosols in Dairy Barns** . . . Theories on fly control are changing: the use of fogging and space sprays in the barn, over and around dairy animals is increasing . . . as compared with use of surface sprays leaving residual deposits. Page 43.

- **Emulsifiable Concentrates** . . . A discussion of properties and characteristics of emulsifiers and emulsion concentrates of interest to pesticide formulators. Page 38.

- **A New Insecticide** . . . Union Carbide Chemicals Company report their new carbamate insecticide, Sevin, has proven its performance in residual control of codling moth, and is effective against resistant strains of boll weevil. Page 45.

- **Application Equipment** . . . Where high pressures are not required, the centrifugal pump has proved quite satisfactory in the spray systems of agricultural application equipment. The diaphragm pump meets some of the requirements of abrasive suspensions, and the hose pump is generally used for liquid fertilizers and soil fumigants. Aerial and ground application equipment under design, and already on the market meet the many specific and complex requirements of modern pesticides, fertilizers, and consumer demands. Page 28.

- **Ammonium Sulfate Fertilizer** . . . In view of the growing synthetic nitrogen industry, by-product sulfate of ammonia producers will do well to up-grade their product, produce a granulated sulfate of ammonia, or even process ammonia to nitric acid. Page 42.

- **Fertilizer Solutions Meeting** . . . What is the outlook for raw material supplies? Delegates to National Fertilizer Solutions Association meeting in Cincinnati, Nov. 18, 19, hear panel discussion on supply outlook. Page 40.

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March 4-5—Western Cotton Production Conference, Hotel Cortez, El Paso, Tex.

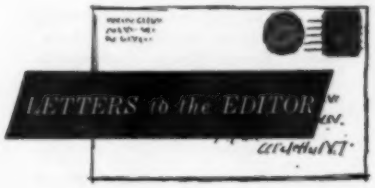
March 18-20—Western Weed Conference, Hotel Davenport, Spokane, Wash.

June 9-11—Association of Southern Feed and Fertilizer Control officers. Heart of Atlanta Hotel, Atlanta, Ga.

June 15-18—National Plant Food Institute, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 25-27—Pacific Branch, Entomological Society of America, San Diego, Calif.

July 18-19 — Southwest Fertilizer Conference and Grade Hearing, Buccaneer Hotel, Galveston, Tex.



In your September number, volume 12, number 9, we find a very interesting article on urea formaldehyde materials for turf-grass fertilization.

Would you be so good as to give us the names of a few American producers of this urea formaldehyde fertilizer.

R. Devers, director
SOCIETY COLONIAL D'IMPORTATION ET D'EXPORTATION
37 Av. de Gaulle
Leopoldville, Belgian Congo

We were pleased to send Mr. Devers names of American producers. —Ed.

I would like to obtain a copy of an article which appeared in your magazine in one of the spring issues. This article concerns the problem facing a typical agricultural chemical company. Hope from this meager description you can trace down the issue we want.

E. G. Law, president
ALLIED CHEMICAL SERVICES
Calgary, Alberta

The article referred to is probably the report in *Agricultural Chemicals* (April issue) of Mr. Fred Shanaman's address before the NAC meeting on "Outlook for Return on Investment." —Ed.

In the October, 1957 issue of *Agricultural Chemicals* there appeared an article entitled "Study of the Mechanism of Caking and its Prevention in some Granular Fertilizers." We are interested in obtaining 100 to 150 reprints of the article.

You are to be commended for including this excellent article in your publication, and we are interested in having copies for distribution.

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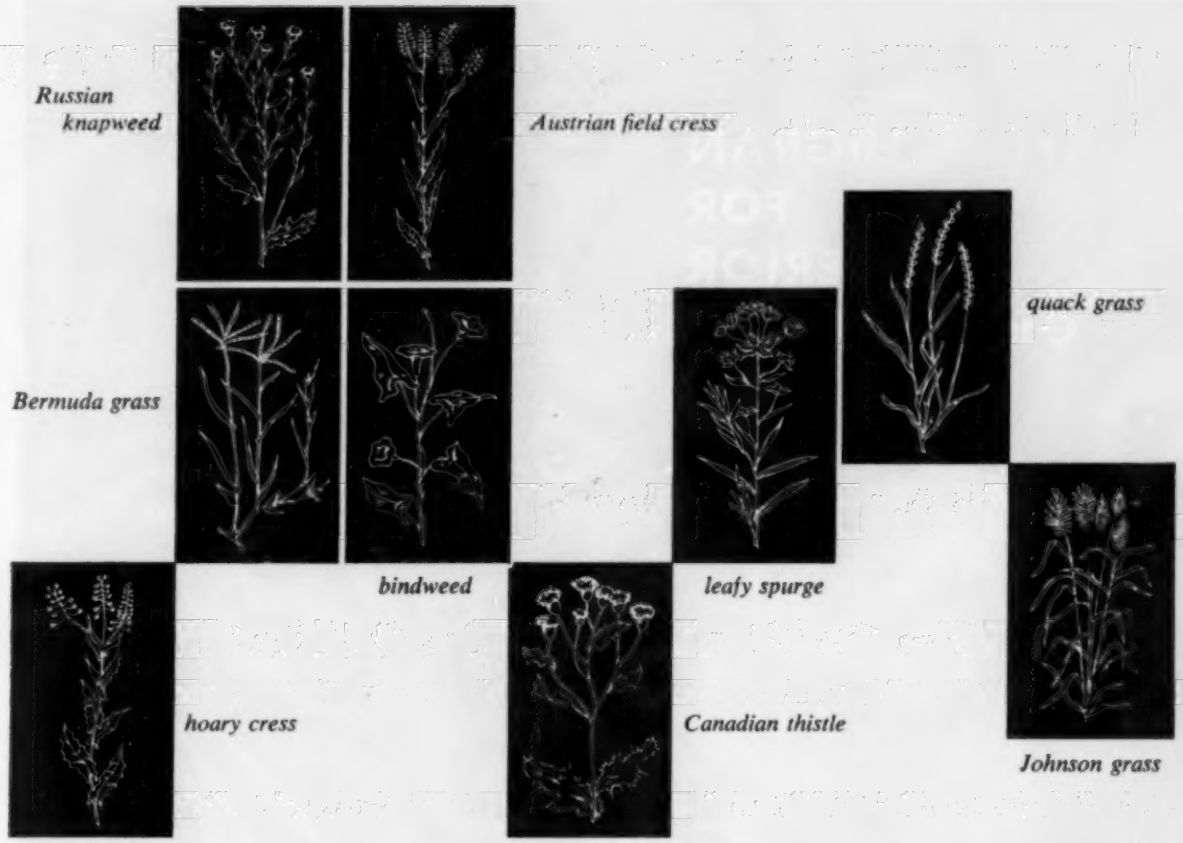

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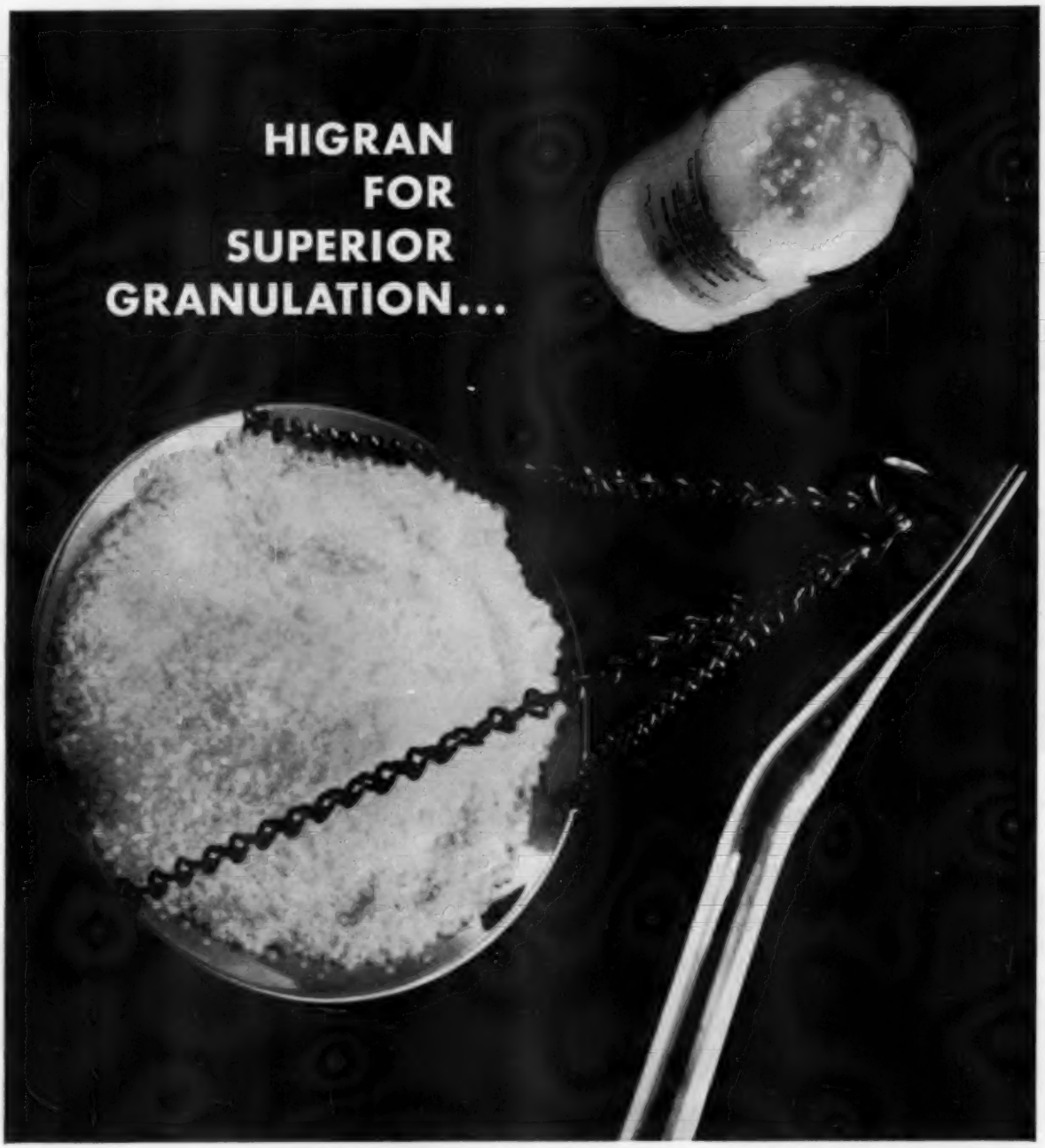

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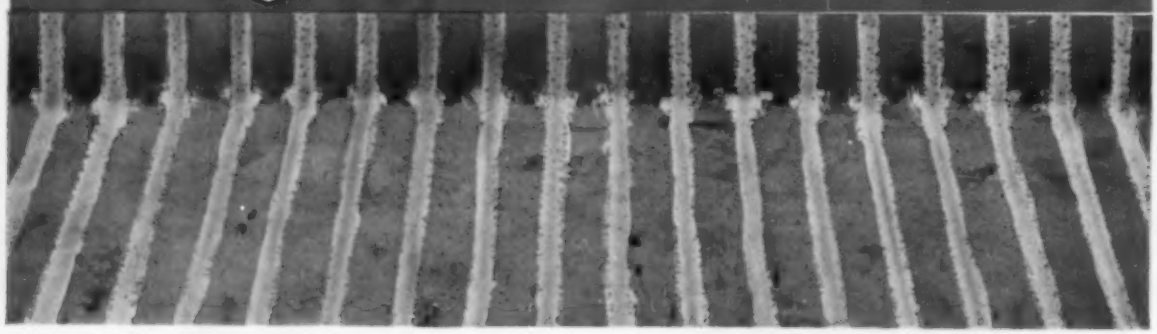

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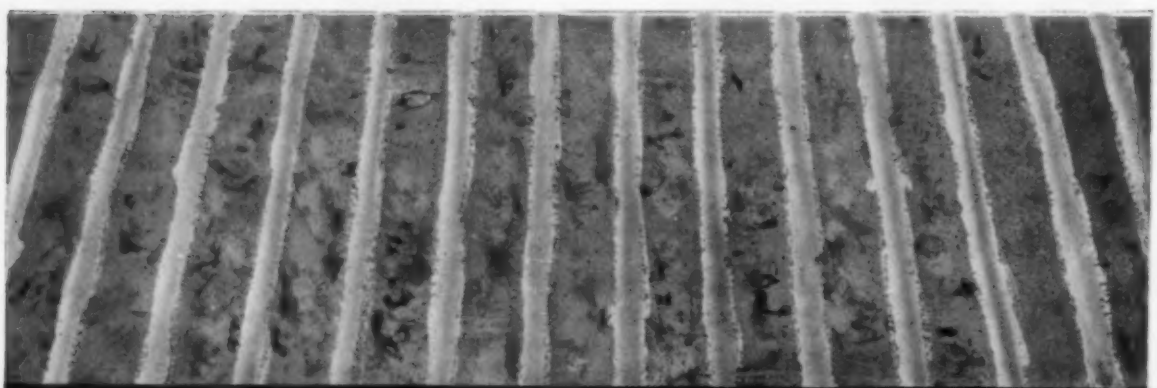

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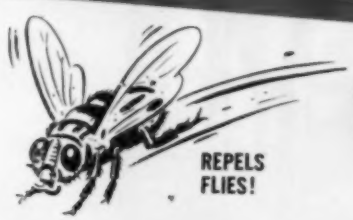

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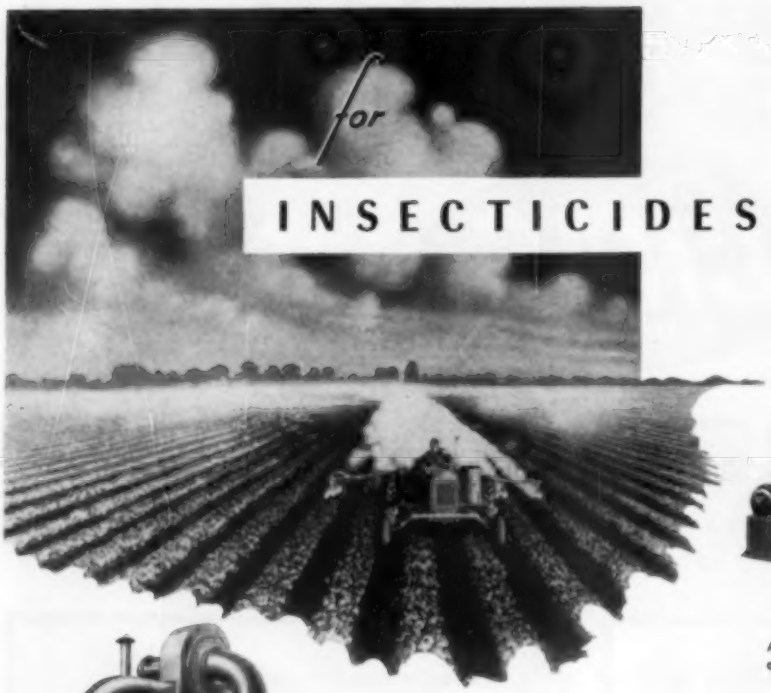

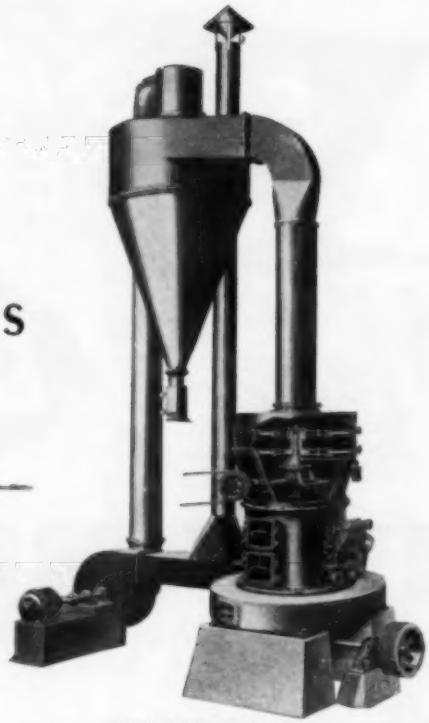

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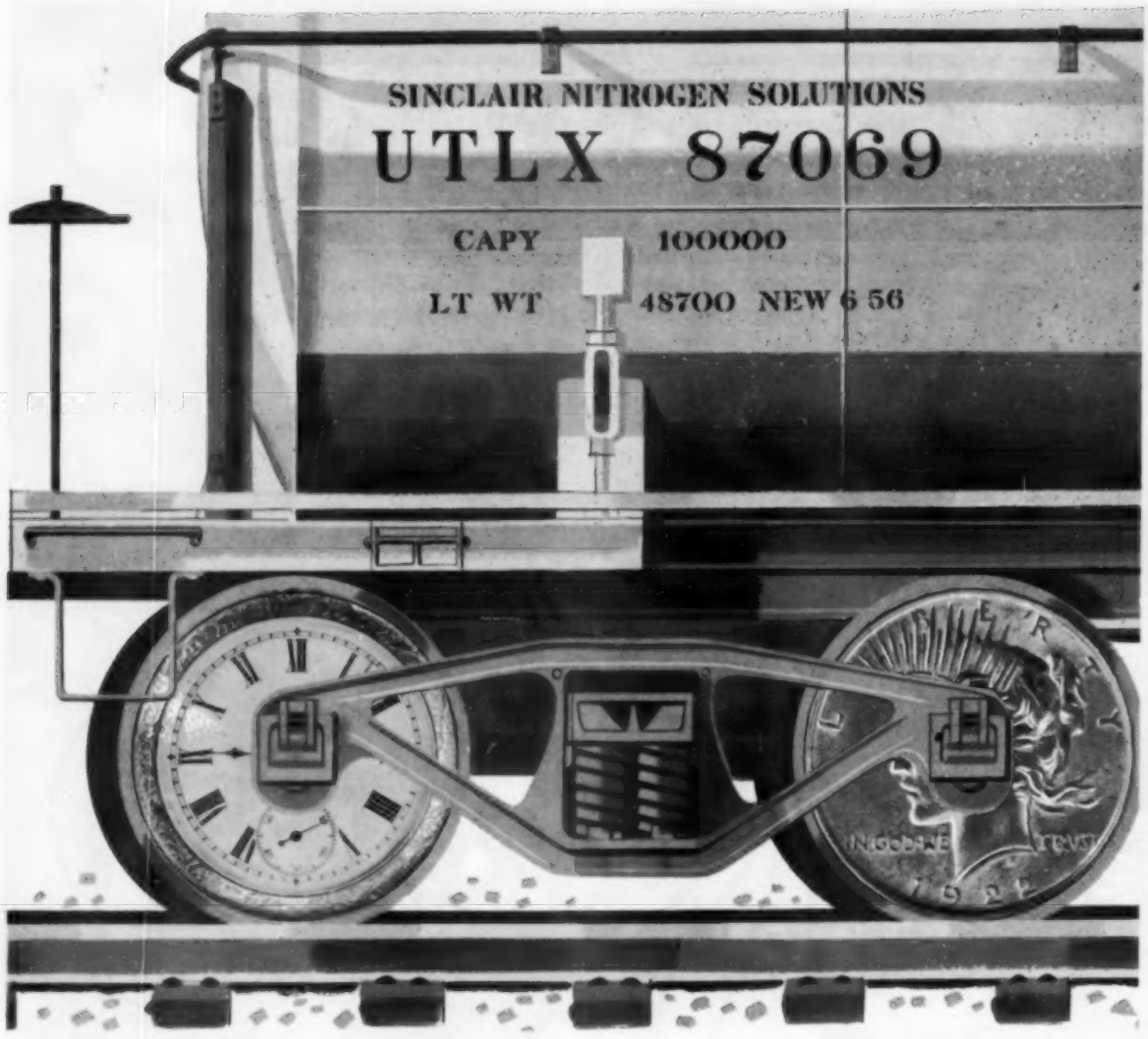

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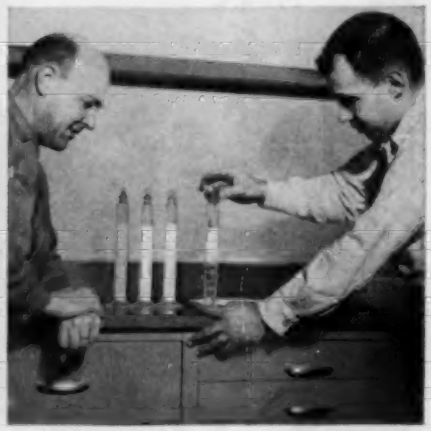

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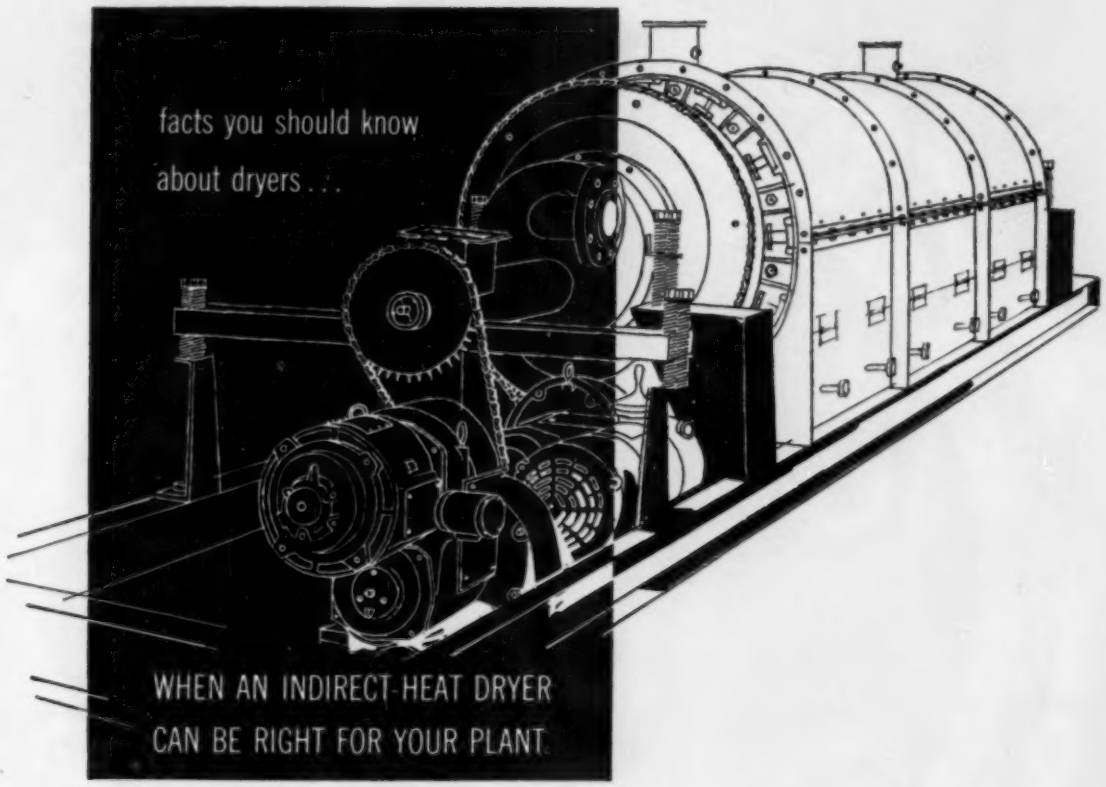

For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

Q. *My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?*

A. You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the dust problem and the heat cost.

Q. *What is meant by an indirect-heat rotary dryer?*

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. *How does an indirect-heat dryer minimize the dust problem?*

A. In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating of the material. Generally, this low air velocity results in insignificant dust loss.

Q. *How does this differ from the operation of a direct-heat dryer?*

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

Q. *It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?*

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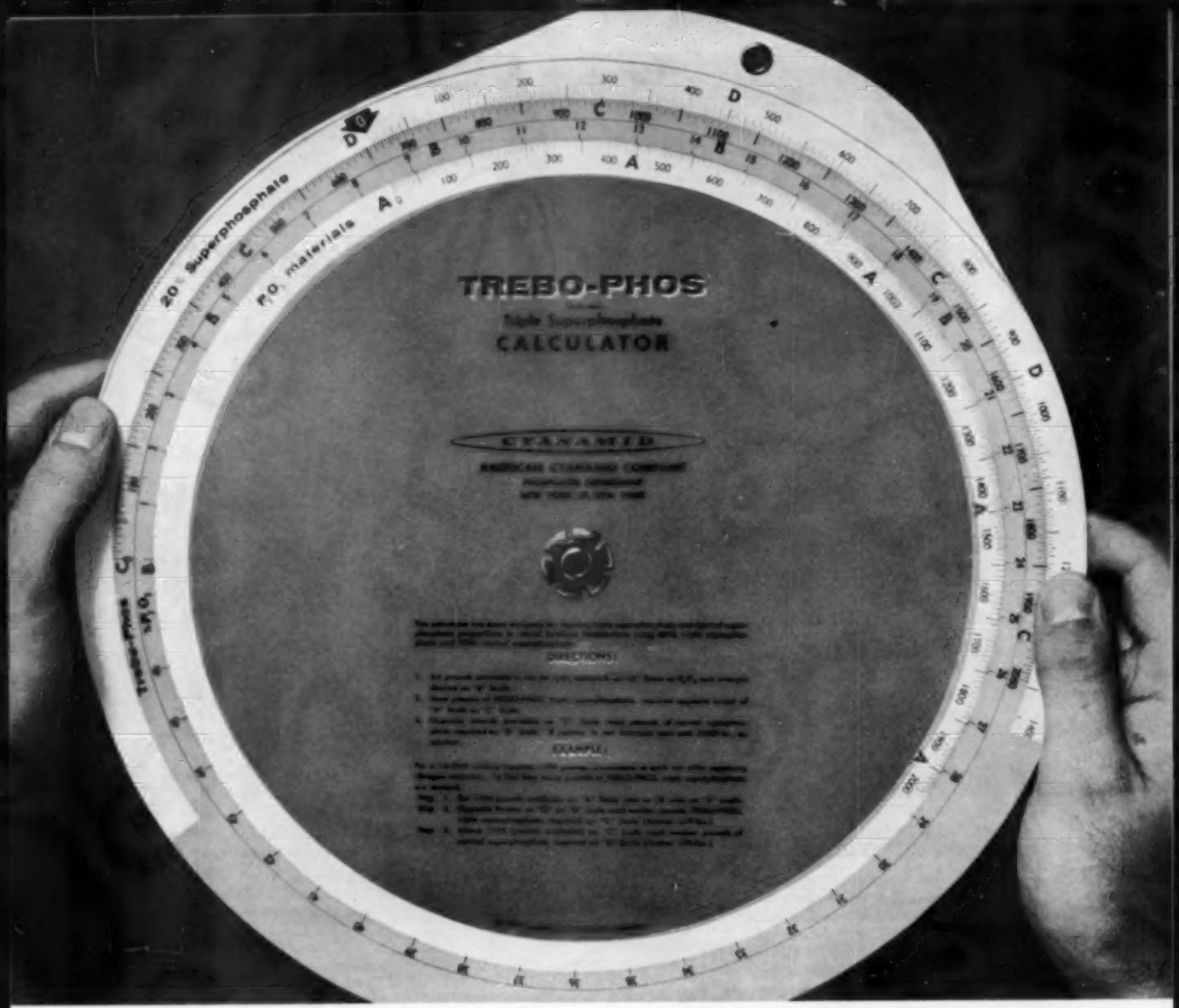

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STEP 2. ***Opposite Pointer at "O" on "D" Scale read number pounds triple superphosphate, required on "C" Scale***
(Answer 619 lbs.)

STEP 3. ***Above 1195 (pounds available) on "C" Scale read number pounds of normal superphosphate required on "D" Scale***
(Answer 576 lbs.)

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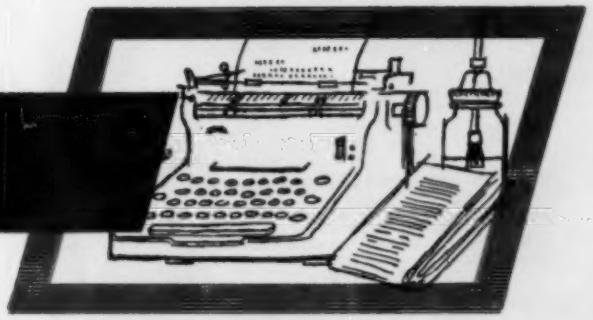
EDITORIALS



RECENTLY we ran across some figures citing the important share of gross corporate profit that is earned by some eighty or ninety of the country's largest industrial enterprises. We were properly impressed, but actually even more mystified than impressed. How the really big units do it is a little beyond us. Seldom does it seem to be as the result of any actual superior efficiency in operation. As a matter of fact the reverse is often true.

A top executive of a medium-sized fertilizer company recently commented quite forcefully on the advantage which the smaller company often has, as opposed to its giant competitor, in making spur-of-the-moment decisions calculated to improve efficiency in operations. He referred to the occasional necessity for making a quick tank-side decision on varying the acid content in a particular formulation, — the freedom a small company manager has in deciding when and how substantially he wants to commit himself on purchase of some raw material that may be starting to advance in price, and the profitable features of buying immediately when a favorable price is quoted on raw materials, or exporting on moment's notice to make that margin of profit very critical to a buying and selling industry.

In the typical major company the responsibility for purchasing may be shared around an entire department, and with big-company red tape and the dozens of forms to be filled out in sextuplicate, opportunities for making favorable purchase commitments are sometimes lost. The flexibility of operation of the small company, where one man often has the authority and responsibility for making such decisions, has much to recommend it.

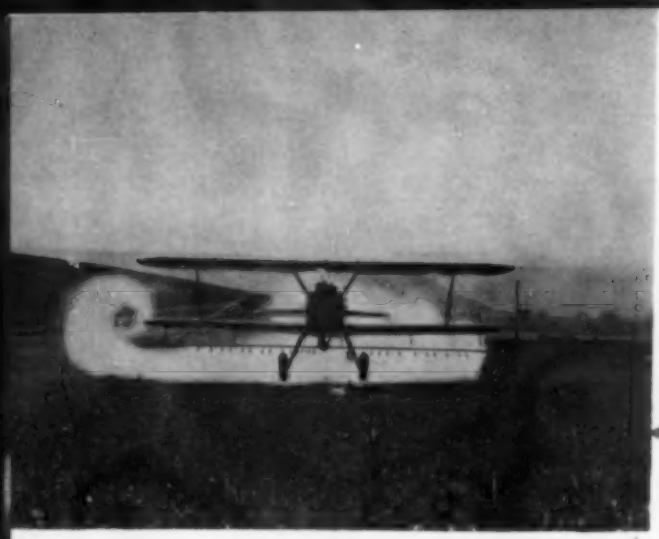
Certainly in the insecticide field the big corporations have not set any profit records to cheer about. There have been a number of cases in recent years where companies which were doing quite well in the profit column under personalized, "small-time" management, were taken over by much larger corporate units, only to see profits disappear and losses take their place. Perhaps the agricultural chemical field is one in which the extra executives, the high overhead and the involved routine of a big company just do not pay off. Certainly, to judge from recent experience, there seems to be no reason, for the moment at least, to fear any such excessive concentration in the insecticide or the fertilizer industry.

* * * * *

PARTICIPANTS in the Fertilizer Round Table held a remarkably successful three-day session in Washington early in November, with over two hundred and fifty plant superintendents, production men and representatives of equipment manufacturers on hand to discuss a series of timely and challenging production problems. The handful of men who started the group seven years ago can well be proud of the progress that has been made and the definite contribution the organization has made and is making toward improved technology in the industry.

Those familiar with the usual association convention, with its occasional overemphasis on the social side and its lagging interest in the business

(*Continued on Page* 103)



Left: A Stearman biplane applying spray at low level for control of the pea aphid on canning peas.

APPLICATION EQUIPMENT for Agricultural Chemicals

by Kenneth Messenger

Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture

THE tremendous growth over recent years in the design of new and improved types of both air and ground equipment for application of agricultural chemicals has been brought about by various factors:

(1) Chemicals have been developed that can be applied as liquids in concentrated form, thereby enabling applicator aircraft to operate in competition with ground equipment and in areas inaccessible to such equipment.

(2) Inexpensive used aircraft and trained pilots were abundant after World War II.

(3) Plant scientists have developed crops more attractive to pests as well as to people.

(4) Public acceptance of infested or inferior products has diminished rapidly.

(5) Scores of introduced pests — for instance pink bollworms, Mediterranean fruit flies, and gypsy moths —have demanded special attention.

(6) Crop losses formerly charged to soil deficiency or disease have been found to be due to nematodes or other pests.

(7) Selective herbicides, insecticides, and fungicides have found wide acceptance.

(8) Improved inorganic fertilizers and the demonstration of their value have rapidly increased their use.

These are but a few of the many factors that have influenced the growth of application equipment. They are recited for two reasons: First, to emphasize the rapidly expanding requirements of such equipment and, second, to lay a foundation for the consideration of future requirements.

Now let's consider these factors and how they influence the use of aircraft. Currently, the acreage treated by aircraft in the United States is equivalent to approximately one-fifth of its cultivated land. The dependence we place in such vehicles seems rather remarkable when we consider that almost all of them were designed for purposes having no relation to agriculture. At considerable cost in efficiency and safety, we are, during this pioneering period, utilizing aircraft such as passenger and cargo carriers, trainers, bombers, and even fighters.

The relatively low cost of war-surplus aircraft and converted, mass-produced types has been a deterrent to the design and manufacture of specially designed agricultural models. However, several are making their appearance, and undoubtedly within the next few years they will begin to effect a substantial replacement of less suitable types and justify their higher cost through increased safety and efficiency.

I do not mean to decry the work of all aircraft now in use, for many of them operate capably. But their days are numbered, and the surplus market will soon exhaust itself as far as agricultural needs are concerned, since most currently produced military types and many commercial types are too fast for agricultural work.

These new types will generally be capable of slower flight during operations. They will take off and land in shorter distances. They will apply either dry materials or liquids. They will offer the pilot better visibility and greatly reduce his susceptibility to injury in case of accident. They will carry a larger payload for a given horspower rating.

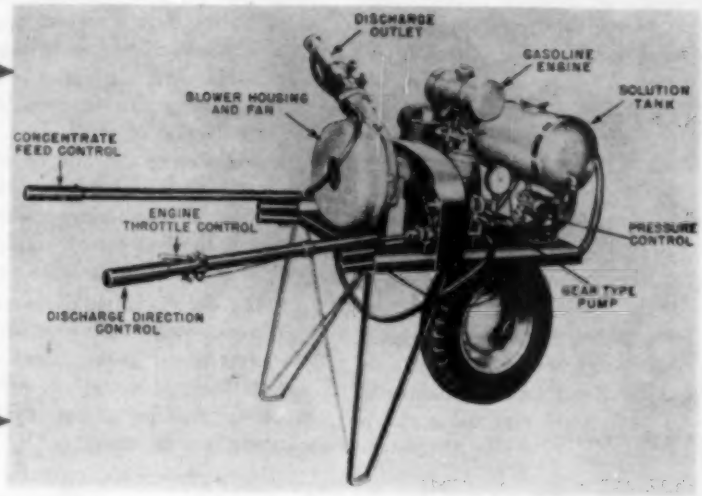
With this improvement in aircraft, dispersal equipment must keep pace. There are now perhaps half as many different chemical-dispersal devices in aircraft as there are applicator firms. Since the number of planes used by one operator averages less than three, the diversity in equipment is indeed great. However, public and private research has advanced some principles that have found rather wide acceptance, and the trend toward a standardization of mechanical details is accelerating.

The problem, of course, has increased in complexity with the remarkable results of research that have given us such an array of new agricultural chemicals, approximately 90 per cent of which had never been

*Based on an address at the 11th Annual Beltwide Cotton Mechanization Conference, Shreveport, Louisiana, October 3, 1957.

Right: A portable mist blower for small area control designed by Potts and Spencer.

Both photos from the book "Agricultural Chemical Application Equipment," by S. F. Potts, (now in publication).



used before 1945. This complexity applies to ground as well as aircraft equipment, but the cost of aerial tests is vastly greater, and each aircraft type has a different configuration with its own peculiar effect on chemical-distribution patterns.

As an illustration, we may look at one effort to improve uniformity of distribution of granulated insecticides, a type of material of great value for some purposes and perhaps with potential in the production of cotton. Preliminary tests were made with a spreader not unlike some dust spreaders now in use. The deposit varied from 5 to 60 pounds per acre across the swath. In cooperative work between the Plant Pest Control Division, U. S. Department of Agriculture, and the Texas A & M College, this spreader was modified to give uniform distribution. The significant aspect of this illustration is that for this single purpose more than 130 test flights were made, with eight different spreader modifications, before the desired results were obtained.

Not only many different types of materials require the use of equipment of different design, but each type of aircraft makes individual demands on the equipment designer. For instance, the modified spreader just mentioned works well on a 450-horsepower Stearman, but it probably would not be suitable for any other type of plane and perhaps not even for a Stearman of lesser power. Furthermore, the spreader was designed for the distribution of 30/40-mesh granules and probably would be less efficient with those of 20/30 or 30/60 mesh.

With sprays, which are of more widespread interest, the design and calibration of aircraft equipment present problems of similar complexity. Height of flight and the length of the boom are the primary influences on the width of swath produced. The coarseness of the spray is affected by the speed of flight and the angle of the nozzles. Only through flight tests with each type of installation and each type of aircraft can the effect of these influences be measured.

Some standardization in aircraft will permit and encourage more uniformity in dispersal equipment, and fortunately the manufacturers of new agricultural aircraft are projecting their skill beyond the field of aeronautical engineering and are designing and producing application equipment suitable for the type of plane they propose to market. Nevertheless, as new materials are developed expensive experimental work still will be required.

An interesting example of a problem faced by equipment designers as a result of improvements in agricultural chemicals occurred not long ago in connection with the control of grasshoppers. As late as 1948 almost all grasshopper-control work was done by applying a wet, somewhat cohesive bait. It was difficult for aircraft to handle, and the swath obtained was very narrow. In 1949 a dry bran bait was first used on a large scale. This was much more suitable for aircraft application, for it flowed readily and covered a wider swath, but discharging it from the large aircraft then needed for this work presented unusual mechanical difficulties. In 1951 oil sprays came into general use. They were much more adaptable to aircraft application and gave a still wider swath than dry baits, but required an entirely different kind of dispersal equipment, and consequently a great deal of experimental work.

Here, within a period of four years, the transition was made over three different kinds of material and three different kinds of equipment to control one insect. None of these changes could have been foreseen far in advance. It is quite possible that equally radical changes may be required of application equipment in the field of cotton production. Tomorrow's cotton pest control may create equipment demands equally as complex as some others recently encountered—dispersing irradiated flies for screw-worm control or eradicating the Mediterranean fruit fly with bait sprays and granulated insecticides

Now let us consider ground-application equipment and then matters common to both aircraft and ground equipment.

Great strides have been made in progressing from dust carts to power dusters of considerable precision and capacity. Air-blast machines, which

I like to categorize as spray blowers, mist blowers, and fog blowers, have replaced high-volume, high-pressure sprayers in many areas; boom sprayers have replaced dusters except for some specific purposes; and seeders have been converted to granule applicators. Here again, the rapid appearance of new chemicals in various forms complicates the design of equipment for applying them. Some are highly corrosive, some abrasive, some dangerous to man, and some dangerous to crops near those being treated.

The boom-and-nozzle, low-pressure, low-volume sprayer, now almost as common as the plow, has several distinct attributes, not the least of which is that it permits the spray to be directed to any part of a plant, and even different proportions to different parts of plants, if desired. However, when we see the ends of long booms whipping fore and aft as they are moved over rough fields, we cannot help wondering how efficient some of them actually are. Certainly under such conditions some plants receive much more spray than others, resulting in poor overall control or a waste of material or both. Under some tillage practices the remedy for this situation is not readily apparent.

The mist blower has the advantage of using high volumes of air and low volumes of liquid, its nozzle orifices are larger and do not clog so readily, and the dispersal pattern is ample enough to give a good overlap with a minimum of spotty deposit. Under come conditions this type of machine has effectively replaced even the row-crop boom-and-nozzle sprayer. Much remains to be done in designing air-nozzle configurations suitable for the treatment of some crops, but from the evidence available it appears that the air-blast principle for applying sprays has a promising future.

The use of granulated pesticides will require much better equipment than is now available for its application. This is especially true of broadcast treatments where thorough and uniform coverage is required. Converted seeders have applied such materials with reasonable success, but often the uniformity of deposit is adversely affected by slight winds. Moreover, along hillsides the distribution may not be good. Here again, a single- or multiple-nozzle air-blast machine may prove to be a good solution.

Common to both aircraft and ground equipment are components such as tanks, hoppers, pumps, agitators, valves, hoses, booms, screens, and nozzles. The design and arrangement of these components, as well as the material of which they are made, affect their suitability for any given job. Consideration also must be given to the type of chemical they may be required to handle.

The current complex of chemicals accentuates the problem of corrosion and abrasion. A five-year cooperative study of this subject by pesticide and application equipment manufacturers and the U. S. Department of Agriculture reveals that tanks are the most common source of complaint. Accumulations of rust and scale are abrasive and tend to plug screens and nozzles. Tanks made of stainless steel or polyester plastic and fiber glass are resistant to a wide variety of chemicals, but tanks of some other materials give fairly satisfactory service if they are cleaned frequently and kept dry when not in use. Metal tanks coated with plastic and fiber glass have also proved durable and trouble-free. Also coatings of heat-cured phenolic and epoxy resin have shown good resistance to pesticides and solvents.

The pump, the heart of the spray system, has been the subject of much research. The requirements are rather complex. Pumps must handle solutions, emulsions, and abrasive suspensions, they must be reasonably impervious to the action of solvents and other chemicals, and their capacity must range from less than 1 gallon per minute for some row-crop sprayers to more than 200 gallons for large aircraft. In general, where high pressures are not required, the centrifugal pump has proved the most satisfactory. It has a wide capacity range and is fairly resistant to abrasives.

Other types of pumps that offer some advantages are the diaphragm pump for abrasive suspensions and the hose pump for liquid fertilizers and soil fumigants where low pressures and low discharge rates are suitable.

In the valve family the most troublesome member is the check valve. In the use of herbicides and in all aircraft work leaky nozzles can result in many difficulties. With aircraft in particular the dribbling of nozzles during turn-arounds or ferrying can destroy crops or wildlife or build up harmful residues. Some check valves on the market operate well with materials free of foreign matter, but even they are not foolproof. Leakage can be reduced by the introduction of small bleed lines between the boom and tank, bypassing the pump, to relieve pressure in the boom when the main valve is shut off. However, the best system employs a positive shutoff valve at each nozzle.

The deterioriation of hoses has been troublesome in the past, but the use of synthetic rubber compounds such as Buna N has greatly reduced problems resulting from swelling, softening, and blistering.

In the design and orientation of booms, improvement continues to be made. With ground equipment the so-called dry boom is finding favor in some areas. In this system the liquid is carried in flexible tubing attached to a structural boom. Among other things, this simplifies rearrangement of nozzles and permits diversity in the design of the boom itself. In aircraft are the added considerations of air resistance or drag, greatly increased flow rate, and the effect of aircraft configurations on the deposit pattern. Booms located directly behind the wing's trailing edge have been found to reduce drag and are beginning to be used commercially. Long booms introduce spray into the wing-tip vortices. The resulting swirl of the spray may increase swath widths, but it may also produce a very uneven deposit or uncontrolled spray drift.

Last among the equipment components comes the nozzle. The hollow cone offers some advantages over the flat spray nozzle. It produces a slightly more uniform atomization and wears less when used with abrasive liquids. More important, perhaps, than drawing a distinction between types of nozzles is to distinguish be-

(*Continued on Page* 103

Report of the Fertilizer Industry Round Table

Officers and executive committee of the Fertilizer Industry Round Table (l to r) vice president, James Reynolds, Davison Chemical Co.; secretary-treasurer, H. L. Marshall, Olin Mathieson Chemical Corp.; president, Vincent Sauchelli, National Plant Food Institute; and executive committee member, Albert Spillman, Fertilizer Manufacturing Cooperative.

USE of urea in ammoniation, factors influencing loss of nitrogen in granulation and storage, optimum plant conditions for ammoniation and granulation, comparison of furnace acid and wet process phosphoric acid . . . are just some of the topics discussed by fertilizer production men and plant superintendents meeting with the Fertilizer Industry Round Table, November 6-8, at the Sheraton Park Hotel, Washington, D.C. Some 250 members and guests participated in discussions led by more than 30 experts from industry and government.

Enthusiastically receiving the program and progress of the association, members voted to re-elect the officers: Vincent Sauchelli (National Plant Food Institute) as chairman; H. L. Marshall (Olin Mathieson Chemical Corp.) as secretary; and two members of the executive board: James Reynolds of Davison Chemical Co. and Albert Spillman, of Fertilizer Manufacturing Cooperative, Inc. It was also decided that the 1958 meeting again be held at the Park Sheraton Hotel, Washington, D.C., on October 29-31, 1958.

Wet Phosphoric vs Furnace Acid

IN a review of the question of use of phosphoric and furnace acid, T. Martin, USI, observed that wet process phosphoric acid (PFS, or phosphatic fertilizer solution) is not a replacement for furnace acid (FA), in general, and vice versa. Furnace acid, he said, is usually too expensive to be considered for the usual wet process acid use. Furnace acid, instead, has its own market as a new product rather than as a replacement. Roger Smith, Eastern States Farmers Exchange, also commented on the cost factor concerning furnace acid, stating that because of production methods of the two acids, it appears likely that wet process acid will continue to be lower in cost than equivalent furnace grade . . . considering the general availability, the amount of electricity required for making elemental phosphorus and the generally lower freight charges applicable to wet process acid delivered to the mixed fertilizer plant.

Comments on the comparative price indicated that furnace acid for fertilizer use is currently selling for $85/ton for 75% acid,—equivalent to $1.50 per unit APA. Wet process acid is priced at about 1.32 per unit APA . . .a difference of about $13 per ton.

Other than the price factor, it was noted that wet process acid has several other advantages as compared with furnace acid: (1) it has several per cent of sulfuric acid which is "free" to the manufacturer for reaction; (2) it contains some trace elements: iodine, aluminum, calcium, manganese, magnesium, and potassium; (3, it contains ¼ less water than furnace acid; (4) it contains metallic units of iron which are desirable in granulation; (5) it offers a permanent depression of the crystallization temperature.

Among the disadvantages commented on are the (1) solids content of wet process acid, which may cause clogging of equipment; (2) the green or black color of PFS which hinders visibility in rotameters (this problem

of course does not exist in some of the other meters).

Roger Smith noted that although there have been reports indicating that wet process acid contributes more to granulation than furnace acid, experience at Eastern States' showed that there is very little difference in their effect on granulation. Wet process and furnace acid each have been used successfully in producing 10-10-10, 8-16-16, 6-18-18, and 6-12-18. Any significant difference in effect on granulation, he said, is related to the concentration. The necessity of using an increased amount of lower concentration acid has the effect of lowering the temperature of the ex-mixer material, which necessitates a slightly higher moisture level to accomplish the agglomeration.

"Perhaps the most important difference between the two grades of phosphoric acid," reported Mr. Smith, has been in the matter of metering to continuous ammoniators. The viscosity of phosphoric acid varies substantially with temperature. The presence of calcium sulfate precipitate adds to the problems of satisfactory meter operation. The meter manufactured by Foxboro Co., which measures the flow magnetically is being installed by many plants for use with phosphoric acid. Reports on its performance appear to be very satisfactory.

Some of the speakers at the round table: (Standing) T. J. Bosman, Federal Chemical Co.; R. G. Powell, Mississippi River Chemical Co.; J. Reynolds, Davison Chemical Co.; B. E. Adams, Nitrogen Division; C. E. Franklin, Phillips Petroleum Co.; Ove Jenson, E. I. du Pont de Nemours & Co.; and R. E. Sorenson, Cornland Plant Foods, Inc.

(Seated) Dr. Vincent Sauchelli, chairman; Howard McNeill, Monsanto Chemical Co.; T. P. Hignett, TVA; K. G. Clark, Eastern States Farmers Exchange; and C. E. Waters, Nitrogen Division.

Factors Affecting Nitrogen Loss

NITROGEN losses are often a serious problem in the production of high-nitrogen grades of fertilizer, Round Table participants agreed in discussing several questions dealing with nitrogen loss during various stages of processing. Possible points of nitrogen loss were reported as: the ammoniator, the dryer and the storage pile. B. E. Adams, Nitrogen Division, observed that no losses are expected in the granulator; that losses in the drier are a possibility when flame is applied direct to the particle, causing overheating. He noted, too, that this can be corrected by correct control of the flame and air flow to avoid over localized heating . . . and that the product temperature should be checked where product losses are expected in the drier. As to losses in the mixer, Mr. Adams suggested the presence of ammonium nitrate and the acid together may cause the ammonium nitrate to break down, but that very large losses are expected to be ammonia.

Also commenting on loss of nitrogen, C. E. Franklin, Phillips Petroleum Co., observed that in localized high temperatures in the ammoniator thermal decomposition and sublimation of the fertilizer material may take place, resulting in nitrogen losses. He suggested that one way of minimizing losses is to distribute the liquid material evenly throughout the length of the ammoniator through spraying equipment, so as not to have large amounts of liquids which may react at any one place in the fertilizer mixer. If after taking this into account, and checking bed depth, nitrogen losses are still a substantial factor, too high a rate of liquid reactants might be a loss factor, and should be investigated.

Mr. Franklin also observed that although most nitrogen losses occur as fumes from the ammoniator; at excessively high fertilizer temperatures in their dryer nitrogen losses will occur. At fertilizer temperatures in the range of 220 to 250°F., the losses may range from one to five pounds of nitrogen per ton of fertilizer. At temperatures above 250°F, losses increases even more rapidly.

In connection with nitrogen losses in storage, G. L. Bridger, Davison Chemical Co., stated that loss in storage of mixed fertilizers does not occur except under very unusual conditions. In high-nitrogen grades, it is possible that decomposition of the nitrogen compound will occur if localized overheating is permitted, in which case the decomposition may spread and a serious fire result. If alkaline materials, such as lime, are mixed with the fertilizer, liberation of ammonia will take place.

T. P. Hignett, TVA, observed that "there are so many variations in equipment, process, and formulation that any general statement regarding nitrogen losses is likely to have many exceptions. With this qualification, we would express an opinion that the largest nitrogen loss is unabsorbed ammonia, and that fume from the ammoniator or dryer is secondary.

Standing: A. V. Slack, TVA; H. H. Tucker, Sohio Chemical Co.; F. T. Nielsen, IMCC; G. L. Bridger, Davison Chemical Co.; Elmer Perrine, Nitrogen Division, G. L. Terman, TVA; T. E. Martin, USI; and R. C. Smith, Eastern States Farmers Exchange.
Seated: Albert Spillman, Fertilizer Manufacturing Cooperative; C. E. Floyd, Virginia Carolina Chemical Co.; J. O. Hardesty, USDA; D. Chapman, and T. R. Schmalz, F. S. Royster Guano Co.

"We wish to take this opportunity to suggest that experiments be carried out in large-scale plants to decrease nitrogen loss by improved control of granulation and by improved ammonia and acid distribution. The latter might be accomplished by providing longer acid and ammonia distributors where this is feasible, or by providing parallel distributors when the longer ones are not practical. In many plants, the acid distributor is not as long as the ammonia distributor, so it would be relatively easy to lengthen it. This might be beneficial in improving nitrogen recovery and decreasing fuming."

Re: Particle Size of Potash

A MOST interesting exchange of ideas was presented concerning particle size of potash in fertilizer manufacturer. John Hardesty, USDA, stated that "Experimental data, as well as data from commercial- and pilot-plant practice, indicate that the optimal particle size of potassium chloride for obtaining high product yields of granular mixed fertilizers is not the same as that for obtaining uniform nutrient distribution in the product." Some of data he cited indicate that:

Solid potassium chloride tends to resist agglomeration with itself and with other ingredients of the fertilizer mixture . . . that the resistance to agglomeration is most apparent in the low-nitrogen, high-potash grades. Distribution of plant nutrients among granules of the final granulated product becomes less uniform as the particle size of the initial materials approaches that of the final product.

After quoting supporting literature references, Dr. Hardesty observed that "all materials for use in granulation processes should be finely-divided, and initial granulation material, when used as a production aid, preferably should include no material larger than 10-mesh in particle size."

Albert Spillman, Fertilizer Manufacturing Cooperative, Inc., stated that experiments conducted on a plant production scale conformed with the findings of John Hardesty.

Mr. Spillman stated that "To enable more uniform distribution of potash into all the range of particle sizes of the complete mixture, best results can be obtained when using the minus 35-mesh standard potash. For difficult mixtures to granulate, (as in low nitrogen mixtures) where coarse potash is used, I recommend using a potash particle size with a minimum plus 10-mesh (all through 10-mesh if obtainable) and minimum of finer than 35-mesh (85-95% plus 35-mesh).

"Coarse potash used in mixtures difficult to granulate with fine potash is very helpful to produce sufficient on-size product recovery to permit good plant operating conditions," reported Mr. Spillman. He cautioned that although using coarse potash is something of a "Utopia" from an operator's standpoint, we must be careful not to use coarse potash if there is the slightest chance that regular fine potash can do the job.

Results of tests using potash of different particle size in granulating 5-2-20 were reported by T. J. Bosman, Federal Chemical. Mr. Bosman indicated that in this low nitrogen mixture, use of coarse potash tends to greater variations in analyses, but that less recycle is formed, thereby cutting down on the quantity of acid and water needed for granulation. The reverse is true using fine potash. He observed that although there is more uniformity in analysis where fine potash is used, there is still a great deal of room for improvement.

G. L. Terman, TVA, gave consideration to particle size of the various fertilizer salts with respect to effect on crops. He noted that because of the high solubility of most nitrogen salts, there is little or no problem in regard to granule size of nitrogen fertilizers. The bulk of potassium fertilizers used are also highly soluble . . . and, he stated, there is no evidence that differences in availability exist over the usual range of size of the muriate or sulfate particles.

The problem of granule size with various phosphate salts is vastly greater and more complicated than with nitrogen and potassium . . . mainly because of the variation in water solubility of the phosphate salts (from high to very low water solubility). Mr. Terman suggested specifying the phosphate salt of a fertilizer; using

fine granules where phosphates have low water solubility; noting that on acid soils, a fertilizer containing about 50% or more of the phosphorus in water soluble forms should be granulated coarsely (6-20 mesh), and phosphates of about 25% or less water solubility should be rather finely divided (-35 mesh).

Ureaforms in Formulation

C. E. Waters, Nitrogen Division, commented on the use of ureaforms in formulations of completed goods . . . powdered or granulated. He noted that ureaforms have been used in formulations of complete goods with considerable success . . . but that such formulations have in the past been primarily specialty fertilizers . . . a 10-6-4 lawn fertilizer being typical.

Mr. Waters also remarked that although he knew of no commercial operation in which solid ureaform is added to a fertilizer mixture prior to granulation, he thought granulation could be achieved. He stated, however, that the relatively high temperature, the substantial amount of liquid phase, and the amount of mixing required for granulation seemed more likely to damage the ureaform, reducing the activity of the water-insoluble nitrogen, than does a simple mixing process.

Ammoniation of Superphosphate

FOUR properties of superphosphate that influence its ammoniation to some degree are: particle size, free acid content, water, and porosity affecting the area exposed . . . stated Elmer Perrine, Nitrogen Division, in a discussion of these factors. Elaborating on the question, Mr. Perrine observed that of the four characteristics listed, that of particle size is probably most important . . . but that the equipment and use of equipment have more influence on ammoniation than do the characteristics of the superphosphates themselves.

Also commenting on the question, T. P. Hignett, TVA, agreed with Mr. Perrine's observations, adding that where ammoniation and granulation are carried out simultaneously, the initial particle size of the superphosphate is relatively unimportant, since the ammonia is absorbed in granules that form during ammoniation. It is important, he said, to prevent overgranulation since ammonia absorption in oversize granules is poor.

John Hardesty, USDA, listed the following among the conditions for best ammoniation: (1) the ammoniation rate for ordinary superphosphate should not exceed 6 pounds of neutralizing ammonia per unit of P_2O_5; for triple superphosphate, 4 pounds per unit of P_2O_5. (2) the initial moisture content of the superphosphates should not be less than 3%; (3) the superphosphates should contain as small a proportion of coarse particles as practicable; (4) the reaction time should not be less than 3 minutes; (5) cooling of the product at the end of the processing stage is essential.

Coating Agents in Granulation

G. L. Bridger, Davison Chemical Co., advised that coating agents or conditioners are definitely beneficial in prevention of caking, but they are needed for only certain formulations and grades which give more trouble than others in this respect. The function of the conditioner, of course, is to take up moisture and prevent caking. An investigation of conditioners indicated that the lower the bulk density of the conditioner and the greater its moisture absorption capacity, the better is its effectiveness. With well dried granulated fertilizers, 20 to 40 pounds of conditioner per ton is usually sufficient to achieve optimum benefit. Larger amounts of conditioner simply tend to make the fertilizer dusty on handling.

Equipment in Review

THE final sessions at the Fertilizer Round Table dealt with equipment, and particularly metering devices in the fertilizer plant. Advantages of using a granulating drum as against a pug mill for mixing and introducing solutions was among the topics of discussion, concluding the session, with one observation that both units are inferior to the TVA continuous ammoniator for use in granulation.

Commenting on the advantages and disadvantages of the TVA cone mixer, A. S. Jackson, Fertilizer Equipment Sales Corp., pointed out that the main advantage of a cone super mill is that the mixing machinery is easier to maintain and has a much lower initial cost than any other conventional means of making super. Normal replacement of worn parts of the mixing unit, weighing and feed equipment, is estimated to be about 1¢ to 2¢ per ton.

G. H. Kemp, F. S. Royster Guano Corp., discussed the factors to be considered in metering high vapor pressure liquids, specifically ammonia

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Some of the participants in the Fertilizer Industry Round Table: Picture at left: W. B. Porterfield, National Potash Co.; R. B. Smith, Eastern States Farmers' Exchange; H. L. Fader, Fertilizer Manufacturing Cooperative; R. D. Taylor, National Potash Co.; and C. D. Fogg, Central Chemical Corp.
At right: Walter Sackett and A. J. Sackett, Jr., A. J. Sackett & Sons Co.

Pinehurst, N. C.:

Carolinas-Virginia Formulators Meet

elect Simches president

THE third annual meeting of the Carolinas-Virginia Pesticide Formulators Association, Inc., held Nov. 18, 19, and 20 at Pinehurst, N. C., featured an address by John Conner, an attorney for the NACA, who spoke on "What an Association Can Do for its Members." The conference attracted some 80 members and guests.

Mr. Conner cited some of the primary problems of the pesticide industry and said that one of the main things an association can do for its members is to work local problems out on a national basis.

Among the industry's problems listed by Mr. Conner were the many new pesticides and the regulatory problems which go with them, the 140 per cent increase of sales since 1940, and the tremendous plant capacity of the industry. The increase in sales, he said, has encouraged manufacturers to minimize the importance of vigorous selling,—and since sales have leveled off somewhat, surpluses are starting to pile up. A plant capacity that has expanded beyond the market is adding to the surplus problem.

Mr. Conner listed the objectives of an NAC program designed to alleviate these problems. A main objective is to create expanded use of agricultural chemicals by developing new uses and establishing the use of pesticides in preventive programs, he said.

A program to combat bad publicity about pesticides is actively being carried on by the NAC, Mr. Conner said. Complete press kits have been sent to editors in the New York area where much unrest was caused by adverse publicity about last spring's gypsy moth spray program. In addition, fact sheets have been sent to local groups, such as men's clubs, to tell the pesticide side of the story.

A nationwide program to counteract adverse publicity also is being carried on by the NAC. It includes a safety program conducted in cooperation with the National Safety Council which includes safety kits and folders; a doctor's information program to provide information on the poisons found in pesticides, together with their symptoms and antidotes, to doctors; and information programs for schools, bankers, and growers.

The NAC has prepared an educational movie on herbicides which is shown in schools and on television stations. A recent issue of the *NAC News* was devoted to the economic benfits of economic poisons and has been distributed to bankers in all sections of the country.

Periscope, a new monthly news bulletin, is being distributed to keep NAC members informed of association activities.

Market development is being aided by television and radio programs. Mr. Conner said that in the Virginia and Carolinas area alone 800 radio broadcasts were presented during the last two years. Fifteen television stations in the tri-state area have used NAC films during that period.

Another function of the NAC is to protect the members of the industry from the constantly increasing costs of doing business, Mr. Conner said. He pointed out that the NAC has been instrumental in getting railroad transportation costs cut about $85 per carload and said that truck rates can be expected to follow suit. The NAC also is attempting to keep label registration costs down.

Mr. Conner gave a breakdown of the NAC budget, the largest slice of which, 38 per cent, goes to public relations and promotion. Government-industry relations takes up 31 per cent and general services to members accounts for another 25 per cent. The retirement program comes in for five per cent and the remaining one per cent goes to the product liability program.

In conclusion, Mr. Conner said that the NAC also serves its members as an industry-wide medium to disseminate technological information.

George Simches, Planters Chemical Corp., Norfolk, Va., was elected president of the C-VPFA for 1958 succeeding J. Myron Maxwell, Maxwell Insecticide Co., Inc., Cary, N.C. John Daily, Daly-Herring Co., Kingston, N. C. was elected first vice president and Frank Reid, Quality Chemical Co., was named second vice president. Hugh Horn of the Howerton Gowan Co., Roanoke Rapids, N. C., was elected secretary-treasurer.

Dr. Clyde F. Smith, head of the entomology department, N. C. State College, Raleigh, N. C., spoke on the 1958 pesticide recommendations and listed the changes from the 1957 lists. On vegetables, rotenone was added to the list of insecticides for controlling the bean leaf beetle. Methoxychlor is recommended for controlling corn earworms on beans and Toxaphene

for controlling hornworms on tomatoes.

The 1958 recommendations call for a reduction in the amount of Toxaphene for control of southern corn rootworm. Parathion has been added to the grape curculio recommendations and DDT is now recommended for the control of the European corn borer. All these changes are additions to recommendations for 1957.

Aldrin, Dieldrin, and Heptachlor have been listed for the control of ants on strawberries in North Carolina. Dieldrin has also been added to the list of recommended insecticides for the control of tobacco flea beetles. Four chemicals have been added to the fight against the boll weevil. Calcium arsenate, Guthion, Malathion, and methyl parathion are all on the 1958 recommendations.

Dr. Henry Gray, Dow Chemical Co., Midland, Mich., told of some new chemicals in agriculture at the meeting and said that farmers must produce larger quantities than ever before and of a higher quality. To accomplish this, Dr. Gray said, the farmer needs new tools to work with.

I doubt that there is one productive farm in the U. S. today, Dr. Gray declared, that does not use at least one, and probably more than one, agricultural chemical that was not heard of 10 to 15 years ago. He told of some recent developments such as recirculation systems for applications of grain fumigants and systemic insecticides to combat cattle grubs.

Dr. Gray listed some old chemicals with new concepts of use, such as chloropicrin, now used as a soil fumigant.

"More and more chemicals will be needed," Dr. Gray predicted, "and as a member of the industry, I can assure you that more will be produced. We all have a very large job to do."

Dr. Herbert L. Haller, assistant to administrator production and research, Agricultural Research Service, USDA, Washington, addressed the group on "Pesticides—Their Formulation and Use."

Dr. Don Ellis, head of the plant pathology department at N. C. State College, told the convention that soil fumigation someday will be be considered almost as essential as the use of pesticides is today. He traced the development of fungicides and said that there is a need for soil fumigants that will be effective against soil fungus diseases as well as nematodes.

Recommendations for controlling boll weevils in North Carolina were discussed by Dr. Walter Mistric, cotton insect research, N. C. State College. He said that if the recommended control measures are taken, even in dry years the costs of the applications will be more than recompensed.

More profit is returned per insecticide dollar when the control system looks darkest, Dr. Mistric said. Unfortunately, he added, the farmers don't have check plots to see what the situation would have been without any control measures.

Dr. Mistric said that a small percentage of cotton land in North Carolina contains weevils which are hard enough to kill to warrant a switch in insecticides. It is up to the individual farmer to decide on a switch, he pointed out, and it is up to the pesticide industry to provide the chemicals.

Rodney C. Berry, director of the Division of Chemistry and Foods, Department of Agriculture and Immigration, Richmond, Va., spoke on regulatory laws. A manufacturer is responsible for his product, he said, and he must give clear directions for its use.

Up until five years ago, Mr. Berry said, the manufacturer did not consider himself responsible for anything but directions. Now labels must warn of possible dangers. Mr. Berry, whose office handles labelling regulations, said "When I recall my experiences in enforcing registration laws and consider the conditions that would exist if the registration laws were not enforced, I feel that they are both necessary and desirable."

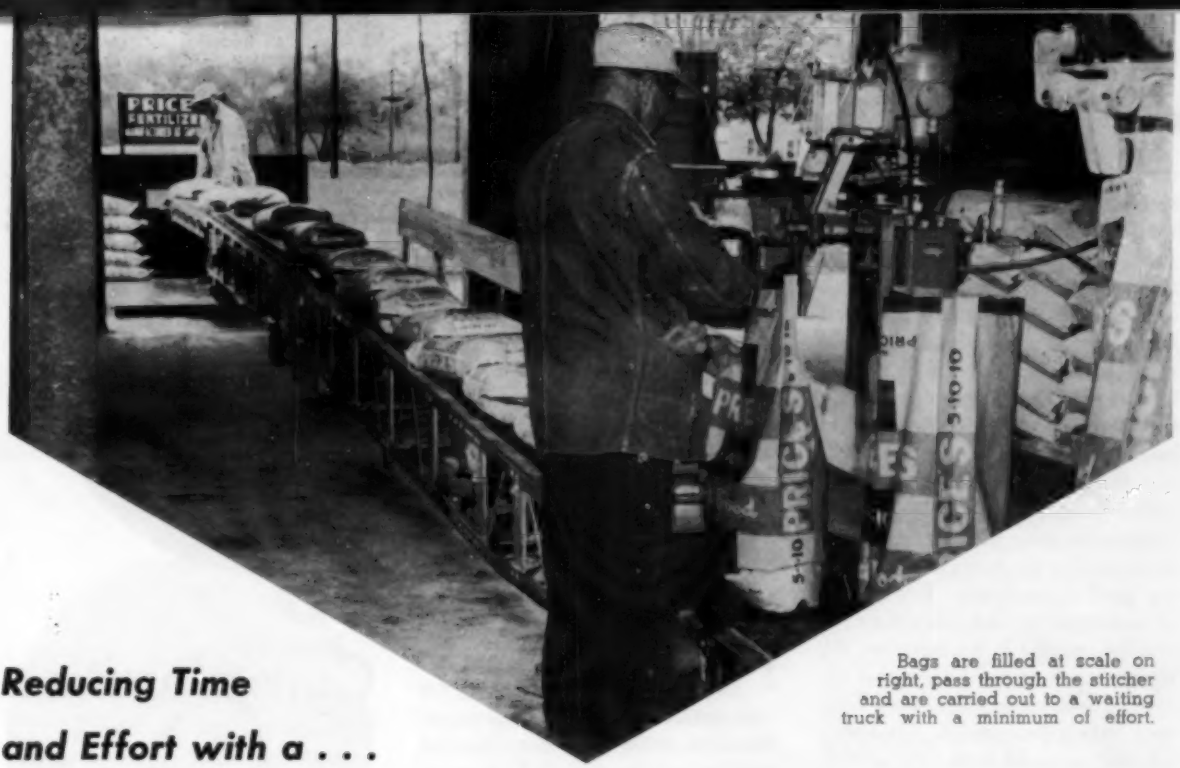
In an informal question and answer period following the scheduled talks at the meeting, Mr. Berry was asked what action his office would take in a hypothetical case involving a formulator who substituted a less expensive chemical for the one listed on his label. Mr. Berry explained that as long as the substitute was not liable to prove harmful to anyone handling the product it would simply be a case of mislabelling.

Mr. Conner was asked if there was any method by which an organization such as the Carolinas-Virginia group could police its members to discourage unethical practices. Mr. Conner said that he did not know of any such arrangement in the agricultural chemicals field. He did say, however, that there is an organization, not in the field, which requires its members to post a sizeable sum upon joining. With this arrangement, the association is able to wield some influence over errant members, Mr. Conner reported.

Referring to a plan for encouraging the use of more insecticides through preventive spraying campaigns, Dr. Smith said that he feels a preventive campaign would tend to cause growers to lose confidence in the insecticide industry. He pointed out that a farmer influenced to conduct a preventive campaign against insects which have not been troublesome in the past would tend to feel that he had been taken advantage of if neighboring farmers, who have not sprayed for the same insects, experienced no trouble. Dr. Smith felt that a carefully planned campaign against known pests would be much more beneficial to the industry in the long run.

One of the subjects introduced for discussion during the meeting was the advisability of following the lead of the NAC and eliminating the spring meeting from the agenda of the C-VPFA. No decision on this was announced at the annual meeting.

A guided tour through the Pyrax mine of the R. T. Vanderbilt Co. at Robbins, N. C., was provided to members of the association during the meeting and included a trip through a shaft some 350 feet below the surface. Pyrophyllite is mined and refined at Robbins by the Standard Mineral Co. which is owned by Vanderbilt. Following the visit to the mine, the delegates inspected the plant where the crude Pyrax is refined, bagged, and loaded directly on to trucks or freight trains.★★



Bags are filled at scale on right, pass through the stitcher and are carried out to a waiting truck with a minimum of effort.

Reducing Time and Effort with a . . .

Conveyor Loading System

A CONVEYOR system installed at the fertilizer plant of the Warren W. Price Co., Smyrna, Del., has replaced the standard, hand-truck method of loading bags on farmer's trucks.

Under the old system, two-wheel hand-trucks were loaded at the stitcher, pushed to the farmer's trucks and unloaded. This was hard, slow work and loading speed was limited to eight 125-pound bags per minute. The new system, utilizing conveyors manufactured by the A. B. Farquhar division of the Oliver Corp., York, Pa., doubles truck loading capacity. Now Price employees handle sixteen of the maximum size, 125-pound bags per minute and almost all manual lifting has been eliminated.

A Farquhar Model 431 heavy-duty power belt conveyor with power belt feeder has been placed right at the point where the bags are filled. This conveyor power-carries the bags from the filling machine to a point near the loading dock. Here the bags move directly onto a Farquhar Model 439 Expand-O-Veyor expandable power belt conveyor which takes them directly to the waiting truck.

The Expand-O-Veyor has a moveable boom which increases the operating length of the power belt conveyor so that the bags can be moved deep into the back of a waiting truck. As the truck is loaded, the Expand-O-Veyor is reduced in length. In this manner the conveyor delivers the filled bags to the loader at just the right point in the truck and at a

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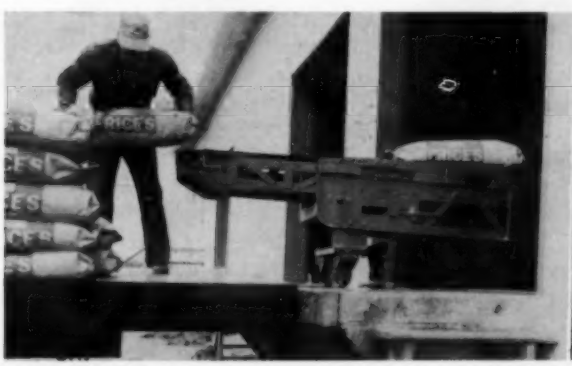
The boom of the conveyor system telescopes into the basic unit as the truck is filled, keeping the bags in a convenient spot for loading.



The bags are moving to a waiting truck on the conveyor which is here shown extended to reach the front of the truck bed where the loading starts.

Emulsifiable Concentrates

Part I

Complexities of Design

THE design of emulsifiable concentrates is complicated by the many conflicting conditions that concentrates have to meet. It has been the author's experience that the technical literature is sparse in discussing these conditions, making it very difficult for the inexperienced formulator to grasp the impact and scope of the problems facing him. Even experienced formulators may find themselves in this bewildering position at times.

In the course of his work, the author has had many discussions with formulators from all over the country regarding the problems of designing good concentrates. Few of the ideas covered in these discussions can be found readily in the literature. Although much of the information uncovered is based on actual work done, very little is documented. The author felt that it would serve well to make these matters available in the following article. It should be noted that the ideas set forth below represent the opinions of the nation's formulators as weighed and interpreted by the author.

Appearance of an Emulsion

A MAJOR consideration in the preparation of a liquid concentrate is its appearance. Although light colors are preferred, the industry insists that the standard concentrate be clear and homogenous. In the mind of the consumer, the association of clarity with purity is quite universal and clarity therefore does add to the salability of the product. Nevertheless, there are technical reasons for favoring clarity and homogeneity that go beyond this elementary appeal.

If the component parts of a concentrate are brought together and result in a mixture that has sediment, turbidity, or layering, the combination is not a compatible one. If a clear product develops any of these characteristics under conditions of cold, heat, and age, then the concentrate is not compatible for our purposes.

Compatibility in a concentrate is of prime importance. A concentrate's *basic* function is to provide an economical means of transporting and effectively applying toxicants. The function of killing insects or other pests is the job of the toxicant ingredient.

To see how incompatibility interferes with this function, let us assume that a normally crystalline material, such as lindane or D.D.T., is mixed with the emulsifier and insufficient solvent. For the purpose of this phase of the discussion, we will assume also that the emulsifier is completely soluble in the solvent. The resulting mixture is a clear fluid with a crystalline sediment; namely, the toxicant.

If we dilute the concentrate and apply the spray, the crystals brought into suspension by agitation will clog the spraying rig. Extra labor, which is expensive, is required to clear it, and time is lost from the spraying operation. Furthermore, some portion of the crystals will remain in the original container so that the spray will be under strength, resulting in a less effective pest control.

Now suppose that while the toxicant and solvent are completely compatible in the mix, the emulsifier is not. The product is now completely fluid but hazy. This haze comes from suspended particles of emulsifier which will ultimately settle out as a viscous layer. The quality of the spray emulsion obtained with such a concentrate will be poorer than that obtained if the emulsifier was completely dissolved. This may be explained by the theory that an emulsifier works best when some part of its molecule dissolves in water and another part, in oil. In this instance, the oil link is lacking or impaired and extraordinary agitation may be required to disperse the viscous layer in the spray.

In special instances, such as brush-killing, the concentrate is diluted with oil instead of water. In this event, the oil-insoluble viscous layer will tend to plug or gum up spray rigs.

Since incompatibility generally results in material remaining in the original container, it means that the concentrate used for the spray emulsion is incomplete. The consumer therefore is not getting what he paid for.

Before leaving this topic, there is an instance where clarity as an index to compatibility is misleading. If a material suspended in a liquid has the same refractive index as the liquid, the mix will appear clear. After a relatively short period of standing, such a mix yields a perceptible layer. With respect to liquid concentrates, there are instances of a perfectly clear product's dropping out the emulsifier as a tarry gum. In the author's ex-

perience, this type of concentrate has always emulsified poorly and has been rejected at the bench on that account before its lack of compatibility was known.

Effect of Temperature

WE have been dealing thus far with the subject of compatibility under conditions usually encountered at the laboratory bench. While liquid concentrates are used in the field generally under chilly to hot weather conditions, freezing weather must also be taken into account if

Nopco Chemical Company

the resulting concentrate is to be practical.

Changing weather conditions often upset both marketing and inventory plans, so that appreciable stocks remain warehoused over the winter with little or no protection from the cold. Again some concentrates, such as those designed for preemergence application, are used early in the season when it may be close to freezing in many parts of the nation.

The effect of cold on liquid concentrates is, to a great degree, similar to the effect of the withdrawal of solvent at room temperature. As the temperature falls, incompatibilities begin to appear, in some cases very dramatically. Prepare a 20% solution of lindane in xylene at room temperature and then drop the temperature to 10° C. Usually in less than an hour sizable crystals will appear. Unfortunately for the formulator, such simple checking is often inadequate. Formulations of certain 4#/gallon, 2,4-D acid equivalent of certain esters will survive extended periods at temperatures well below 0° F. but will ultimately yield crystals. Experienced formulators know the difficulty of crystallizing even highly purified weed-killer esters. Yet such concentrates must be designed to prevent crystallization when marketed in the northern states and in Canada.

At the other temperature extreme, we have a number of factors working against compatibility. Since concentrates are used throughout the hot periods of the year and large amounts are warehoused in hot climates, the effects of heat even more than those of cold must be considered in the design of a formulation.

An extreme case, but one that occurs often enough to require serious consideration, is the storage of a concentrate in a black drum at a railroad siding under a blazing southern sun. Under similar circumstances, leaf temperatures may go as high as 120 to 130° F. It doesn't take much imagination to estimate a black drum head reading 20 to 30 degrees higher. If the drum sits at a railroad siding for even a few days and the material it contains is heat-sensitive, something is bound to take place. We have implied that lower temperatures favor incompatibility. Initially higher temperatures favor compatibility, but they add to the complexity of the situation by favoring chemical reactions as well.

In a normal liquid concentrate, almost all the conditions favoring chemical activity are present. Most toxicants are far from inert. They are toxicants because their chemical properties permit them to react with and thereby interfere with the body chemistry of the pest. The emulsifier molecules, in many cases, are also relatively reactive. If a catalyst is needed, traces of iron may be present as a result of using iron mixing equipment and iron containers. Even traces of water introduced from a large number of sources may be present, e.g., the ingredients of the concentrate, or even trapped moist atmospheric air. Mix all these factors together in a concentrate and one can expect a reaction to begin. To take an extreme case, certain emulsifiers, when mixed with toxaphene and kerosene, will result in a very dark product with a tarry deposit in a matter of hours. Whatever emulsifiability the concentrate had initially will have markedly degenerated. Here the reaction takes place very rapidly.

Such rapid reaction rates are rare, for today's techniques have improved. Nevertheless, if the formulator expects his concentrates to last through two or three seasons he must take into account the ability of heat to increase the rate of these reactions.

Studies of simple chemical reactions yield predictable reaction rates at different temperatures. To the formulator, predictable rates would be invaluable in helping him to evaluate the heat sensitivity of his formulations. Unfortunately because he is dealing with a highly complex chemical situation, it is economically unsound for him to study all the variables involved, and he is forced to study his problems empirically.

Why should a mix of three substances—toxicant, solvent, and emulsifier—be so impossibly complex? Because not one of these three substances is simple!

Toxicants are not even 99% pure. In actual practice, many of them are mixtures of isomers and related compounds (BHC, for instance). A weed killer ester may contain appreciable quantities of dissimilar materials, such as phenols, acids (both organic and inorganic), and alcohols.

Emulsifiers too are usually blends, and the ingredients making up the blends may be derived from natural substances having a wide variety of different molecular structures.

Solvents also contribute to complexity. The usual petroleum hydrocarbon solvent is a mixture of aromatic, aliphatic, and naphthene molecules. Although they are far less reactive than toxicants and emulsifiers, they do contribute to unpredictable compatibilities when the other components react. Some solvents may also contain traces of sulfur and water which participate in the reaction picture.

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FERTILIZER SOLUTIONS ASSOCIATION MEETS

THE National Fertilizer Solutions Association held its 1957 convention at the Netherland-Hilton Hotel, Cincinnati, November 17-19, with a record attendance of over 350 members and guests. Under the direction of E. E. Crouse, U. S. Liquid Fertilizer Co., retiring president, and E. M. Harper, Nitrogen Division, general convention chairman, an interesting program had been set up which highlighted raw material supplies, new products, sales promotion and general corporate management.

Richard Cecil of Bartlett & O'Bryan Fertilizer Co., Owensboro, Ky., was elected president of the association for the coming year. Wm. B. Parrish of Auburn, Ill., is the new vice-president; Geo. H. Serviss of G. L. F. Exchange, Ithaca, N.Y., is secretary; and John L. Wilson, Semo Liquid Fertilizers, Inc., Charleston, Mo., treasurer. These and the following constitute the board of directors: W. R. Bone, Monsanto Chemical Co., St. Louis; C. B. Coleman, Fabricated Metals, Inc., San Leandro, Calif.; E. E. Crouse, U. S. Liquid Fertilizer Co., Indianapolis, Ind.; Donald A. Fletcher, Pacific Supply Cooperative, Portland, Oreg.; Donald Foster, Nitrogen Solutions, Ottawa, Ohio; Ernest M. Harper, Allied Chemical & Dye Corp., New York; Wayne R. Johnson, Johnson Brothers Mills, Shenandoah, Ohio; O. L. Ohnstad, Ohio Liquid Fertilizer, Inc., S. Solon, Ohio; W. Harold Schelm, Schelm Bros., Inc., E. Peoria, Ill.; Hugh S. Surles, Jr., Planters Cotton Oil & Fertilizer Co., Rocky Mt., N.C.; F. Todd Tremblay, Washington Cooperative Farmers Assn., Seattle, Wash.; Donald R. Weber, Spraying Systems Co., Bellwood, Ill.; and John White, Auburn Fertilizer Co., Auburn, Neb.

Ben Titus of U. S. Liquid Fertilizer Co., reporting for the Standards Committee, said that committees will be appointed by the new president of the association to make a three-part study: application practices and equipment; tanks, including their construction, sizes, openings, and state regulations which apply; corrosion.

Raw Material Outlook

THE first panel discussion, with E. E. Crouse as moderator, dealt with the Raw Material Supply Outlook. H. H. Tucker of Sohio Chemical Co. spoke for the nitrogen industry. Demand for nitrogen products has been expanding tremendously since 1950 and plants have had to be built at a rapid rate to keep pace. There are currently 44 companies with 54 nitrogen plants in the United States. Should all plants be operated at capacity there would be a substantial surplus. Indications are, Mr. Tucker said, that this surplus capacity will be taken up by about 1959 or 1960. "It is well to remember," he said, "that these indicated surpluses are based on annual production and do not necessarily mean surpluses during all periods of the year. In fact, the sale of nitrogen during the first half of the calendar year far exceeds capacity to produce during this period."

Turning from these basic figures on anhydrous ammonia to urea, one of the nitrogen end use products which has been growing most rapidly in popularity with the American farmer, the speaker indicated that in spite of the fact that 8 companies are now producing urea at 9 different plants, with a total U.S. supply of 460,000 tons for 1956, "demand for urea leads us to believe that at times in 1958 urea will be in short supply similar to 1957." With start-ups of new urea plants late in 1958, the supply situation may ease somewhat in 1959 and 1960.

"By 1959 total urea production in the United States is expected to total at least 720 thousand tons annually. There are indications that additional urea plants may also come on stream in late 1959 or 1960. In summary, urea markets are expanding rapidly and so are production facilities. Fertilizer markets are the major expansion force. The near term supply situation could remain very tight.

"Experience of the past few years has shown a very rapid drop in inventories of nitrogen materials during the spring season, with the 1957 drop being much greater than in any of the three preceding years. Inventories of anhydrous ammonia dropped from a somewhat normal early spring peak of about 170 thousand tons down to almost 60 thousand tons. This 60 thousand tons is only one-half that of the lowest inventory during the entire year of 1956. Other materials such as urea, ammonium nitrate, ammonium sulphate, and nitrogen solutions all experienced the same tight situation this past spring.

ELECTS RICHARD CECIL

"The extreme peak period of fertilizer usage is now a reality and to be expected when farmers no longer are fearful of a short supply. This accentuates the storage problem for raw materials, base goods, or end product if the farmer's demands are to be met. Even though there may be surplus capacity to produce raw materials, capacity to store liquid fertilizers for these peak periods is very inadequate. A word of warning then seems to be in order. It is suggested that each fertilizer manufacturer and distributor accept his share of the responsibility for storing the fertilizer he will need. This need for storage of raw materials applies to other nutrients as well as nitrogen.

"Since storage is needed, it certainly is important to hold the cost of this storage to a minimum. This might be done by storage of end product in mild steel tanks either at manufacturing points, dealers' locations, or on the farm. Storage might also be for base materials such as 11-22-0 or 16-8-0 which can be quickly blended into desired grades. The advantage of either of those methods would be that low cost non-pressure mild steel tanks could be used. Still another approach might be to store the raw materials in order to have adequate supplies when needed. With nitrogen materials these might be stored as ammoniating solutions, solutions of salts, or dry urea. Some nitrogen solutions would, of course, require high pressure tanks or dilution to reduce vapor pressures to store in non-pressure tanks. Solutions which salt out around 32° F. might well be stored in tanks imbedded in the ground to prevent excessive chilling of the solution.

"When one considers the need for extra storage tank capacity for both phosphoric acid and nitrogen it would seem that neutral base goods containing both nitrogen and phosphorous might permit greatest tank storage at minimum cost."

W. R. Bone of Monsanto Chemical Co. discussed the supply picture on Phosphoric Acid, noting that the liquid fertilizer industry has been expanding rapidly over the past several years, with consumption in the corn belt and neighboring areas estimated at about 250,000 tons for 1957. The number of plants has increased from about 72 in 1955 to 165 this year. The supply of elemental phosphorus, he indicated, presents no problem. Stocks are adequate. Plant capacity to burn the phosphorus and produce phosphoric acid is also adequate, he stated, although there may be some tight spots. The real problem, the speaker suggested, is to produce, stock and ship to meet the heavy seasonal demand, which tends to come from all areas at about the same time. He suggested that the association should undertake a study of the problem of transportation and storage to aid efficient scheduling of production and shipments by suppliers.

Mr. Bone dealt briefly with superphosphoric acid, indicating that several suppliers of phosphates are considering going into production on this material which would allow the production of higher analysis end products. Very few liquid fertilizer plants are at present set up to ammoniate it efficiently, however, with adequate cooling capacity an important "must". Producers would be required to make substantial capital investment to produce the material, and it would logically command a premium price. Before going into such a production program, Mr. Bone suggested, phosphoric acid manufacturers would want to know whether the liquid fertilizer industry really wants superphosphoric acid, is prepared to pay for it and to employ it efficiently.

Concluding the panel, Dean Gidney of United States Potash Co. discussed the supply outlook for Potash. "Potash is currently plentiful," he observed (See pg. 93) "but the imbalance is not great and it would take only a slight surplus of demand over supply to completely reverse the picture." There are factors affecting the demand side, he suggested, "which could rapidly change the outlook in that direction. Even in the U. S. farmers are using less than half as much fertilizer as the experiment stations and soil scientists say could profitably be used." Also the underdeveloped countries of the world could, before too much longer, start to become substantial users of potash. "Think of the world potential," he suggested, "where you have a tremendous country like India using less than 1% as much fertilizer and potash per acre as does Japan."

Howard R. Lathrope of the Nitrogen Division, Allied Chemical & Dye Corp., outlined the essentials for running a successful educational meeting. In his opinion many farmers are still confused about fertilizers, and do not realize the big yield increases possible through application of a balanced ration of fertilizer. Crop yields, he emphasized, are necessarily limited by the deficiency of any one essential crop nutrient. Many farmers still

need to be sold on the important role of fertilizers in increasing output, but through sound educational practices fertilizer manufacturers can convince them.

Sales and Administration

A PANEL discussion on "Essentials to Success" featured three speakers from Ohio State University, with Ernest M. Harper serving as moderator. Successful Business Management was the phase covered by Dr. John K. Pfahl. Every successful business must be adequately capitalized, he counseled, and one of the best ways to get at least part of this capital is to plow back earnings. Selling on credit is normally necessary in most markets, he noted, but the efficient operator of a business should realize that it costs to sell on credit and he must recover from his credit customer the added cost involved in a credit sale. Bad debts, he reminded, are just one small phase of the cost of credit selling. Much more important are such factors as the cost of the capital tied up, bookkeeping, the expense of efforts required to effect collections, etc.

Percentage return on sales, the speaker noted, is a figure often accorded much importance by business men. This is not in itself a highly important factor, however, and it varies from industry to industry. A much more significant figure is percentage return on capital invested. In a field like the liquid fertilizer business such return should be at least 10%, he suggested, to justify the capital risk. To improve the rate of return on investment, three possibilities present themselves: do a larger volume without an accompanying increase in costs; keep substantially the same volume but at a lower cost (perhaps by eliminating unprofitable accounts); decrease investment by having less capital tied up in the business.

Dr. Gordon Ryder spoke on "Selling a Fertility Program." Soil testing, he believes, is the foundation for any such program. "I cannot conceive how a sound fertilizer recommendation can be made without first knowing what is in the soil. The soil test is the best technique available at the present time to correlate crop response to fertilizer application."

Dr. Ryder believes, however, that soil testing may have been oversimplified. A reliable soil test requires many exacting procedures and much special equipment, he observed, and unless the analysis is correlated to known applications of the nutrients—N, P and K—and the responding crop yields, a sound interpretation or recommendation cannot be made. The end result of the soil test is of course the fertilizer recommendation. At Ohio State their recommendations are always made for considerably above average yields, and set adequately high to build up the general fertility of the soil in addition to fertilizing the specific crop planted.

Turning to a consideration of placement factors, Dr. Ryder noted that the trend seems to be in the direction of lower applications of fertilizer in the row at planting time. As soil fertility rises, the speaker suggested, the importance of row placement becomes less.

Dr. John W. Sharp concluded this panel with suggestions on "Marketing Fertilizers." First, he said, you must know your product, and be sold on it. You must be familiar with how your particular product fits into the overall fertilizer picture—its costs and limitations. Second step is to get acquainted with the customer's needs, which is often a problem, for the farmer doesn't always know what he wants, or at least what he needs, himself. The farmer, the speaker suggested, seems to favor a two-season credit policy, and is often discount-conscious if there is sufficient incentive in the form of reduced cost. Third step is to analyze demand, checking to see if farmers in your area are employing adequate fertilizer programs in accordance with recommendations of their advisors. These three preliminary steps prepare the way for an intelligent sales program. Suggestions by the speaker on this point were that it is important to sell the successful farmer, who is often imitated by other farmers, the young farmer, who is normally not so reluctant to change, to concentrate on repeat business and to keep a high volume of sales on a cash basis. Also, he counseled, "stay away from deals," and try to iron out the seasonal peaks and valleys in sales as much as possible.

Fertilizer Additives

THE final session was concluded with a panel discussion of additives to fertilizer solutions, with Robert B. Ellsworth, U. S. Liquid Fertilizer Co., as moderator. C. A. Hamsher of the General Chemical Div., Allied Chem. & Dye Corp., New York, discussed pesticides. A wide range of such products is available for possible incorporation with fertilizers, but the emulsifiable concentrates, he advised, "are the ones at present that are most suited for application with fertilizer solutions." For efficient combination use, both pesticide and fertilizer ingredients must be compatible, and it must be reasonable to use both at the same time without adversely affecting either pest control or plant nutrition.

The speaker listed a series of questions which the formulator should ask himself before planning on combining pesticides with his fertilizer solutions: What is the pest problem? Can it be controlled by soil treatment with an available pesticide? If this pesticide is applied with a fertilizer solution, will they both be applied at the ideal time for pest control and plant nutrition? Will both materials be effective if applied to the soil surface, or under the soil surface, or in bands, or broadcast as may be the usual practice for application of this fertilizer or for control of this pest? Can the chosen pesticide be mixed and stay well mixed during the entire period of application, or will it separate from the fertilizer solution and give you an uneven application and erratic results and possible plant injury? Will the pesticide fertilizer mixture have any effect on the germination of seed or on the flavor of this or next year's crops? Will the use of this pesticide cause any hazard to those consuming this crop? Will the use of the pesticide in your equipment contaminate it so that it may

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PUSH BUTTON CONTROL for DAIRY FLIES

by W. E. Dove
Fairfield Chemical Division
Food Machinery and Chemical Corporation

Pressurized aerosols are used as needed in dairy barns for killing flies. After estimating the number of cubic feet in the barn, the operator releases the aerosol for a measured period of time to emit the desired amount of toxicant per cubic foot.

Mechanically produced aerosols are provided by devices that use oil solutions of pyrethrins and piperonyl butoxide.

Fogging devices vary from portable type shown to larger machines, including some that can be operated from pressure lines of milking machines.

WHEN it comes to the control of fly attacks, the old dairy barn ain't what it used to be. New methods of operation and newer insecticide formulations have brought about an entirely different approach to fly control on dairy animals and in dairy barns.

Behind all this evolution in combatting the seemingly eternal problem of fly attack can be seen the apparently subtle but nevertheless firm hand of government regulations that insist upon this use of insect toxicants that will not contaminate milk or milk products when used for protection against dairy flies and mosquitoes.

And, as happens when experience shows itself as an infallible factor in judgment, theories on fly control are changing.

This latter fact is most important. It involves mainly the increasing use of fogging and space sprays in the barn, over and around the dairy animals, instead of surface sprays on walls that would tend to offer residual effectiveness against flies.

The space spray or fogging principle is based on sound logic. For one thing, surface spraying within the barn, around the doors and windows, however effective, cannot control horn flies that are carried by the animals into the barn, unless they choose to leave the animal, the source of their food supply, and move to a sprayed surface, which few are likely to do.

For another, it has been determined through years of experience and investigation that surface spraying brings about fly resistance to certain of the insecticides, particularly the chlorinated hydrocarbons, through contact of the flies with the chemicals involved.

So, taking into consideration the above factors, and also taking cognizance of the regulations regarding the type of insecticides which are per-

mitted for use, the trend now is toward fogging and space spraying while the animals are in the barn, and before milking to attain a higher degree of fly control. This operation not only eliminates the flies in the barn and on the animals, but gives a noticeable degree of protection to the animals when they are returned to pasture.

Fogging or spraying, whichever is used, is made possible for dispersion within the barn when the dairy animals are present by the application of insecticide materials that have been found to be without hazards to the animals or milk or milk products.

The chemicals permitted are very limited in number. One is pyrethrins, obtained from the tropical pyrethrum flower. While effective, pyrethrins have been found more effective and more economical when combined with synergists such as piperonyl butoxide, a synthetic organic. A combination* of pyrethrins and piperonyl butoxide has been adapted for use in aerosols, fogging machines, space sprays and as wettable powders or emulsions in dairy fly control.

The Food and Drug Administration reviewed data on milk and meat of animals that had been sprayed for long periods of time, and has stated to the U.S. Department of Agriculture that it takes no exception to the use of fly sprays containing piperonyl butoxide and pyrethrins.

Just recently, something new was added to this chemical combination. This was the development of an improved Pyrenone† concentrate that make possible the manufacture of insecticides that are completely stainless when properly used. Not only will these new concentrates prove of advantage for use around dairy cows, other livestock, or show animals, but they will find ready acceptance in the home, in food handling and food processing plants, in hospitals, restaurants, hotels and other areas where staining by insecticides has been a problem.

*Fairfield Chemical Co., Baltimore, Md., offers a combination of pyrethrins, and technical piperonyl butoxide trade marked as "Pyrenone."

†Offered by Fairfield Chemical Co., Baltimore.

Making use of these materials in the most effective way has brought about the development of equipment so varied in type of application that the dairy farmer has a choice to meet his specific problem of fly control.

Time was, of course, when the so-called "flit gun" was the only practical means to spray cows for combatting the fly menace. But while it is an old device, the spray gun is time-honored and still is used widely, particularly by farmers with small herds.

Easier methods of protecting cattle against flies, of course, are the pressurized sprays and aerosols for dual treatment of barns and cows within the dairy barn. And even with these, the farmer has a wide selection. Aerosols for dairy use are available in low-pressure size of 12 ounces, 16 ounces and two and one-half pounds, and a five-pound high pressure bomb. Fogging machines and microsols are other devices for attaining fly control.

One of the most ingenious methods yet rigged for cattle protection is the so-called treadle sprayer. This is an unique chute-like contraption through which the cattle walk on their way to the barn, the water trough or the salt block. As the animal steps on the treadle floor of the housing, a fine spray of insecticide is emitted from the nozzles on the side, on the "spray yourself" principle.

In Wisconsin, a system called "Push Button Control" has been under test and in use for the past several years for dairy barn fly control, and has had unusual results. This involves either conventional equipment for space treatments or an apparatus with a switch-controlled compressor which forces air through a fogging machine, picking up a potent insecticide spray and sending it drifting over the cows in a fine mist.

The new device, which fits onto a jar that suspends from the ceiling, has a four-headed nozzle, which sends the fog all over the barn from a central point. The procedure is to close the windows and doors, set the time clock on the fogger system to run a certain number of minutes, depending on the size of the barn and the output of the compressor. Then flip the switch. When the fogging stops, the doors and windows are left closed for a few minutes, then opened and milking can begin.

Prolonged field tests and actual use have shown, according to professor E. H. Fisher, entomologist of the University of Wisconsin, that the fogging with a pyrethrin-piperonyl butoxide formulation destroys practically all of the flies within the barn, gives the cows a degree of protection while they are in pasture, and makes the barn an uncomfortable place for flies to rest or use their wings. For the Wisconsin tests, Prof. Fisher used a spray containing 1% piperonyl butoxide and 0.1% pyrethrins, in a deodorized oil base.

Special compressors are not necessary for the fogging operation. Some of the devices, including the four-headed nozzle now on the market, operate on milking machines as well as air compressors.

Equally good results were obtained with pyrethrin-piperonyl butoxide in space spraying tests for horn fly control in dairy barns in Western Oregon. A total of 17 applications were made over a 172-day period on 65 cows in a barn of 30,000 cubic feet. In this case, pyrenone 50-5 was used at 76 c.c. per gallon of base oil, at the rate of 3 to 4 ounces per 1,000 cubic feet on each application. Cattle receiving such treatments reportedly experienced fewer flies for several hours after they returned to the pasture.

Other investigations have shown that about one-half of this application is effective for killing the flies in the barn or about 1-2 ounces per 1,000 cubic feet. This is normally at a discharge rate of one gallon per hour, or about 2 ounces per minute, using a fan to help disperse the insecticide particles.

The insistence of the labelling office of the Department of Agriculture that insecticide formulators bring their formulas for dairy cattle fly control within the confines of the Miller Bill is of course of vital interest to the dairy farmer. But it certainly is not all with which the farmer should be concerned.

(*Continued on Page* 111)

Carbide's New Experimental Insecticide

—A Report on Sevin

SEVIN is an insecticide with a broad scope of activity. In laboratory and field experiments it has shown good control of a wide variety of insects which affect such crops as cotton, fruit, tobacco, vegetables and citrus.

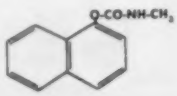
Sevin is known chemically as 1-naphthyl N-methylcarbamate. It has good residual properties and is relatively safe to mammals. It was first field tested as "Experimental Insecticide 7744."

Sevin is said to provide excellent residual control of codling moth in apple spray schedules applied at 10-14 day intervals. Similar residual action has been observed in field tests on apple aphid, oriental fruit moth, pink bollworm, Mexican bean beetle and others. It has also been found to be effective against resistant strains of insects such as boll weevil and codling moth.

Sevin has been compared in the laboratory directly against several of the most widely used insecticides. A series of tests have been conducted by investigators at the Ohio Agricultural Experiment Station on control of apple insects and Mexican bean beetle on green beans. Dr. C. R. Cutright conducted the apple tests, and Dr. J. P. Sleesman headed the work on Mexican bean beetle.

Sevin being added to spray tank for experimental field application.

No injury has been observed in the phytotoxicity tests in the laboratory or in the large scale field experiments when it has been used at recommended dosages on important crop plants such as bean, corn, tomato or cotton.



Sevin has been found to be compatible with most other insecticides and fungicides. No adverse effects have been noted when it is combined with DDT, glyodin, ferbam, captan and maneb.

Acute toxicity tests of Sevin indicate an oral LD_{50} for rats of 500-700 mg./kg. In rabbit skin penetration tests the LD_{50} has been shown to be greater than 2000 mg./kg. Long range feeding tests in dogs show a low order of chronicity and no pathological changes have been observed.

It is to be noted that although Sevin, in common with other active carbamates is an inhibitor of the cholinesterase enzyme in insects, its mode of action is probably different from that of the phosphorous insecticides in that it does not combine chemically with the enzyme.

In this investigation many structural modifications have been explored in the naphthyl carbamate series. Several of these compounds have shown activity but the results of toxicity tests and extensive field evaluation firmly demonstrate that the unique structure of Sevin best combines the properties of high toxicity to insects with safety to humans.

Union Carbide Chemicals Company, Division of Union Carbide Corp., New York, manufacturer of Sevin, expects to market the insecticide as soon as collection of toxicity data and compliance with federal regulations are completed.

NPFI Discusses Fertilizer Consumption Survey at SEFC

DR. Russell Coleman, executive vice president of the National Plant Food Institute, presented a seven-point program designed to increase fertilizer use in the South by 7.8 million tons in ten years at the second annual Southeastern Fertilizer Conference in Atlanta, Ga., Oct. 31.

The 1954 census shows that only seventy per cent of Southern farmers are using any fertilizer, Dr. Coleman pointed out, and they are using an average of about one-half the amount recommended by agricultural experiment stations. He said that the tonnage target for the fertilizer increase program is based on a realistic potential for fertilizer usage in the South.

This survey has been conducted by National Analysts, Inc. for the Institute. Dr. Coleman summarized the preliminary results of the study for the conference and said that the study seems to point specifically to the state agricultural colleges and the services which they render as having the most influence with farmers.

In the light of this fact, he said, it seems that NPFI's primary job is to create the most favorable relationship possible between industry and the state agricultural colleges.

Specifically, Dr. Coleman listed the following seven points suggested by the National Analysts study; Support soil testing programs, lend support to county agent, work more closely with local credit agencies, support carefully planned demonstrations in cooperation with state colleges, use testimonial type success stories, continue research grant programs, and test on a research basis and in a concentrated area the techniques recommended by National Analysts to determine their effectiveness.

Dr. Moyle S. Williams, NPFI, presented some preliminary results of the survey prior to Dr. Coleman's address. The conference also heard comments on the preliminary results of the survey from Dr. Webster Pendergrass, University of Tennessee, and Dr. H. L. Dunton, VPI.

The new office building at Bartow, Fla., of the Florida Phosphate Division, Davison Chemical Company Division of W. R. Grace & Co., has been completed and now houses the 65 administrative, office and engineering personnel of the division. It is approximately 170 feet long by 70 feet wide, with 10,500 sq. ft. of floor space. Suitably landscaped, it is of masonry block construction, air conditioned and centrally heated.

(1) Rock-grinding section. Storage silos for rock are at left; triple superphosphate production-building at the right; one of the dust-scrubbers (with tower) is seen at far right. Power sub-station is shown in foreground.

(2) Three Raymond 66-inch roller mills used for grinding phosphate rock.

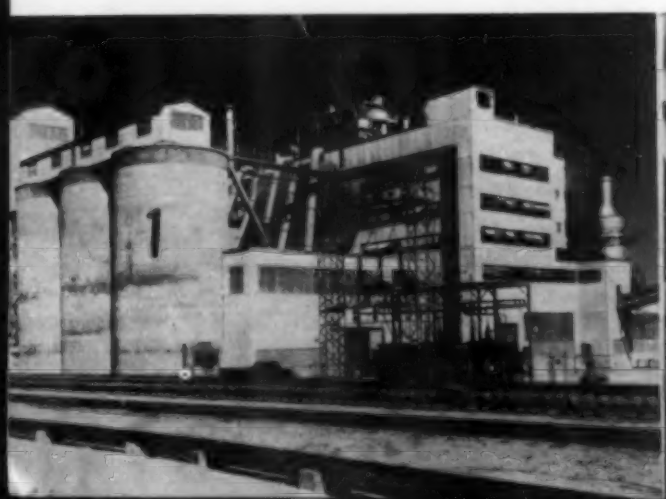
(3) Pauway 4 Table Plant—After washing and classifying, phosphate particles are concentrated on these shaking tables which separate them from large quantities of sand of an equal size.

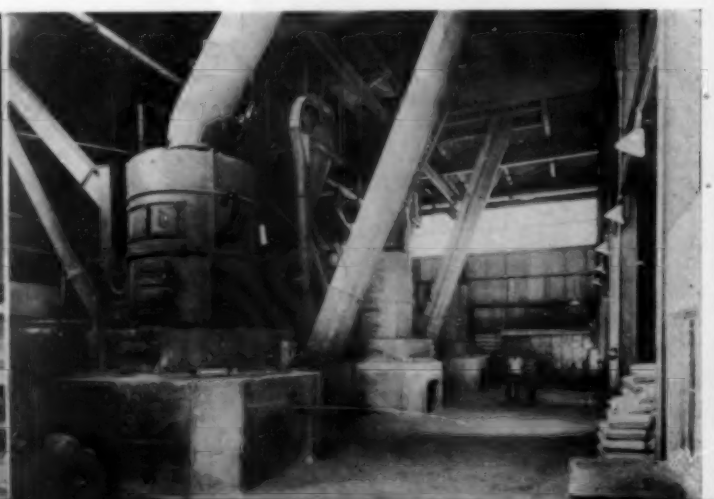
(4) General view of Davison triple superphosphate plant near Bartow, Florida.

Davison

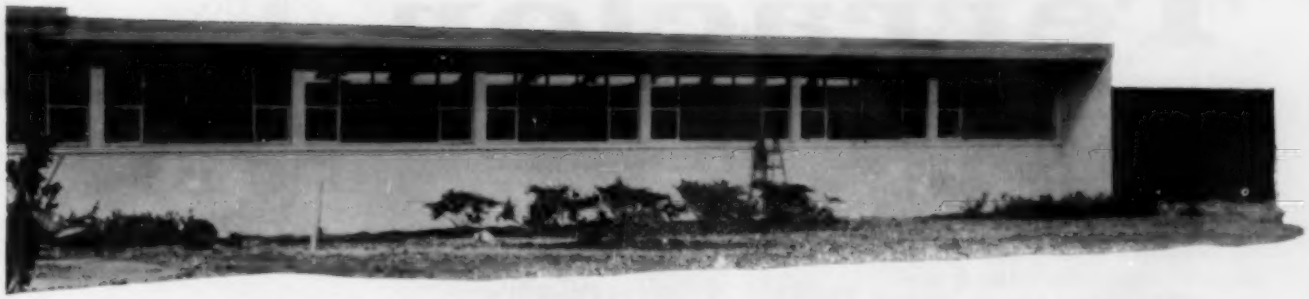
REFLECTING the trend in industry to locate in areas well separated from the large population centers, the Florida Phosphate operation of the Davison Chemical Company Division of W.R. Grace & Co., has been experiencing rapid growth, with triple superphosphate manufacture added to phosphate rock mining and processing, and most recently with the construction of a large office building landscaped comfortably into the Polk County countryside.

Location of the activities is in and near Bartow and its neighbor Ridgewood. These may be regarded as sub-





Fourth in a series of articles on the agricultural chemical industry's relocation of plants and offices in the suburbs.

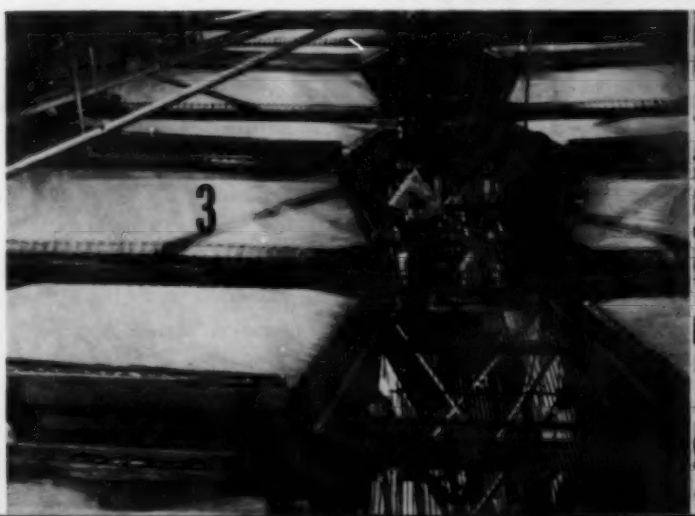


expands in rural Florida

urban to the city of Lakeland. The entire area has a satisfactory pool of labor of various classifications, good climate and living conditions. The company holds some 17,000 acres of land and employs nearly 800, a gain in ten years of approximately 100 per cent.

In Davison's phosphate rock mining, large draglines are used to remove the overburden and expose the rock-bearing matrix. The latter is slurried and pumped to a nearby washer and recovery plant. Some of the rock is sold as such: part is shipped out for Davison's use at normal superphosphate plants in Baltimore and elsewhere. In the latest development, that of the triple plant, a portion of rock is processed at the point of origination, to make an integrated mining-manufacturing operation. Triple superphosphate is made from sulphuric acid in the first acidulation and then a second batch of rock is acidulated with phosphoric acid. Large quantities of sulphuric are used in the process.

All this expansion strained the former facilities available for administrative, office and engineering personnel, so this year Davison opened a building more than ample for the 65 employees presently in these categories. It is 170 feet by 70 feet, with 10,500 sq. ft. of floor space, air conditioned and centrally heated.



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GARLIC: White rot control with TERRACLOR has resulted in increases of 20-30 sacks per acre and paid for the chemical many times over.

WHEAT: Several pennies worth of TERRACLOR seed treatment per bushel can result in smut-free yields worth up to $20 per acre.

ORNAMENTALS: Increased yields of vigorous, disease-free plants, flowers and bulbs are the return for a few pennies invested in TERRACLOR soil and bulb treatments.

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Ammonium Sulfate

— its current status

A Staff Report

THE spectatcular growth of the synthetic nitrogen industry in the United States from about 0.5 million tons in 1940 to about 4 million tons in 1956 has not been accomplished without disturbing the nitrogen materials market.

Sales managers and plant superintendents of byproduct coke-oven works are carefully studying market reports, consumption and production charts and fertilizer trends, hoping to find answers to such questions as—what is happening to the sulfate of ammonium market? What can we expect in sales during the next three to five years?

The answers are not easy to come by. The whole nitrogen market picture is somewhat blurred owing to the remarkable expansion of synthetic ammonia facilities domestically and abroad, and to improved technologies in processing complete fertilizers. In the United States, the new fertilizer consuming areas of the Middle West and Far West are demanding granulated, high-analysis fertilizers. To meet this demand, the fertilizer industry has been installing modern chemical-engineered plants at strategic locations in such areas for the production of both raw materials and finished products. The operating departments of these new plants have had to revise traditional production methods including formulation of mixtures. Unit production costs have had to be kept at a minimum to enable each plant to survive the new competition.

In the search for relatively cheaper per-unit materials for the high-analysis goods, such low-analysis, inorganic nitrogen carriers as sulfate of ammonia, calcium cyanamid and nitrate of soda containing 16 to 21 per cent nitrogen have had to yield to the more concentrated materials, such as ammoniating solutions with 26 to 49 per cent total nitrogen; anhydrous ammonia, 82 per cent; urea, 45 per cent, and solid ammonum nitrate, 33.5 per cent nitrogen. In other countries, the United Kingdom for instance, the manufacturer is concerned about maintaining as high a content as possible of water soluble phosphate in his mixed fertilizers because the local laws do not recognize citrate soluble phosphate as a plant nutrient. Hence, the practice of ammoniating superphosphates, such as is common in American plants, has not been adopted since ammoniation can cause reversion of the soluble to less-soluble phosphate. Therefore, in Great Britain sulfate of ammonia continues to be used almost exclusively in formullating fertilizer grades, and constitutes about 75 per cent of all nitrogen consumed. But, in the United States, competitive materials are forcing the displacement of purchased sulfate of ammonia in mixed fertilizers, it being cheaper where needed, for many grades at least, to form sulfate of ammonia in situ during the mixing operation by ammoniating surplus free sulfuric acid.

The by-product coke-oven industry in this country has not adjusted its facilities to the trends in fertilizer technology, as exemplified by the new productive capacity of granulated, high-analysis fertilizers. At present sulfate of ammonia makes up only about 6 per cent of the total agricultural nitrogen consumption.

Beginning about 1930, the fertilizer industry in the United States started to use ammonia in its manufacturing process, generally in the form of ammonia solutions in which ammonium nitrate or urea and later both salts were dissolved. The practice has ever since been increasing despite the many technological obstacles which had to be overcome. At present, ammoniating solutions dominate the field as sources of nitrogen in processed fertilizers.

It is a well-known fact that ammonium salts leave an acid residue in the soil. One unit weight of nitrogen as sulfate of ammonia requires about 1.5 units of calcium carbonate to give the same combined effect on the calcium content of the soil as calcium nitrate or nitrate of soda. In this connection, it is interesting to note that a very large market for direct application ammonium sulfate has been developed in the Pacific states, more particularly in California where the acidifying properties of this salt are utilized to improve the agricultural value of alkaline soils. The following tabulated figures ilustrate this deveopment.

Table 1.
Consumption of direct application ammonium sulfate in Pacific states.

Year (Calendar)	Pacific States Tons	California Tons
1935	45,464	40,964
1940	58,607	53,107
1945	82,843	71,206
1950	169,211	131,185
1953	209,712	154,523
1955-56	191,973	140,934

Source: U.S. Bureau of Mines and U.S. Department of Agriculture.

Market Still Substantial

ALTHOUGH the current domestic market is not as strong as formerly, sulfate of ammonia is still in the

(*Continued on Page 105*)

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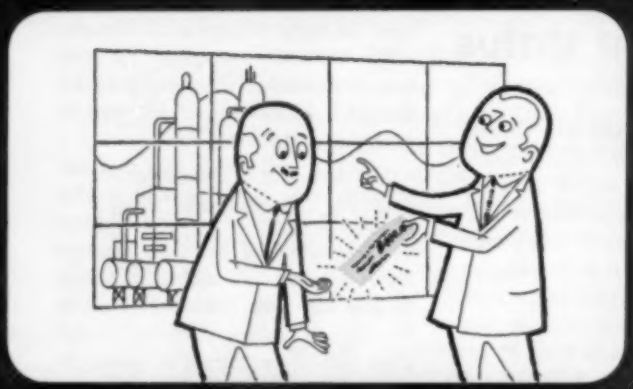
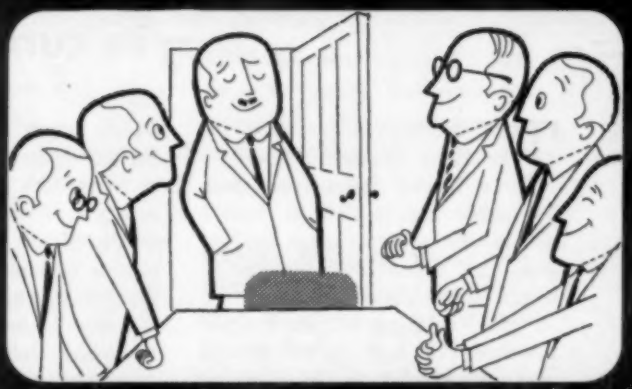


You may want Lummus to build on a *guaranteed maximum* contract. Any savings are then shared with you on a pre-arranged basis.



Or maybe you prefer a *cost-plus* arrangement. Your auditors and directors will cheer Lummus' astute purchasing.

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New Pesticides, Plant Foods Presented At 17th Garden Supply Show In Chicago

by H. H. Slawson

THE 17th National Garden Supply Show, held on Chicago's Navy Pier, Nov. 10, 11 and 12, presented a wealth of new pest control chemicals and plant foods in newly designed packages and an extensive array of equipment and supplies to help the home gardener do a better job in the 1958 season.

Mechanical equipment, both light and heavy, for every garden need, included hand and power applicators for insecticides and fertilizers, and occupied a line of booths half a mile long in the center of the huge Navy Pier exposition hall. Paralleling these on either side, more than 200 manufacturers and wholesalers displayed an almost unending assortment of garden supply merchandise.

Overall attendance was estimated at well above 5,000 dealers. Preceding the show opening, the second annual garden supply retailers' short course at the Morrison Hotel, Nov. 9, offered a capsule training course in store floor salesmanship for garden supply dealers. More than 1,000 merchants from the midwest, southwest and Pacific coast area took advantage of this feature.

One newcomer at this year's show was National Carbon Co., New York, a division of Union Carbide, which made its first public showing of its new line of packaged garden products. These include rose, floral, vegetable and tomato dusts, a chlordane ant killer, fruit tree spray, multi-purpose garden spray, a chlordane crab grass preparation, a general purpose weed killer, an aerosol rose spray and an aerosol home and garden insect killer. All bear the "Eveready" brand name. National advertising will be given this new line on radio and TV and in magazines and newspapers, according to D. K. Harrison, general sales manager.

California Spray Chemical Corp., Richmond, Calif., presented their elaborate dealer aid program for 1958, several new chemical products, the well known "Ortho" garden books, now entered for seven regional sections; a display kit with, among other items, ten posters designed to keep dealers abreast of changing seasonal garden needs; and a "Look" wall card for chalking up special offerings.

New Ortho products for 1958 include an aerosol rose and flower bomb containing "Phaltan" for control of powdery mildew and black spot; a space spray; and a dormant oil spray kit for the home gardener.

Diamond Black Leaf Co., Div. of Diamond Alkali, Cleveland, displayed a new pre-mixed spot weed killer, "Wilt," and announced that, for better results, Black Leaf 2,4-D, now includes a sticker in the formula. A new "Sheen" fungicide for rose black spot is offered in a package containing eight small portions, each sufficient for one gallon of spray.

The Du Pont Co.'s newest product for the garden supply trade is an aerosol tree wound dressing, first made public at the Chicago show. It's packaged in a 12-oz. push button container. The material sets quickly, to form a smooth, black seal and, unlike the "tar baby" stuff of other days, the company publicist says the user "can safely wear a white shirt without even rolling up his sleeves."

Another new Du Pont product shown was a garden insecticide which, it is claimed, "will drop most insects on the wing and maintain a residual action for an extended period after spraying." The other was a 72 percent chlordane insecticide, recommended for lawns, flowers., shrubs and ornamentals, and for control of subterranean termites. These new formulations bring to a total of 28 the Du Pont garden chemical line, Howard Weibel, sales manager, Wilmington, Del., was in charge.

Niagara Chemical div., Food Machinery & Chemical Corp., Middleport, N. Y., introduced a new weed killer, "Swep" in pellet form for use around sensitive plants. This had been tested experimentally in Indiana last year and is now authorized for nursery use, according to a spokesman.

Featured also in Niagara's display was a new rodenticide, "Diphacin," described as "ten times stronger than technical warfarin. It is offered in 4 oz. and 1 lb. vacuum-packed tin containers, lithographed by Canco. The can has a unique "self feeder" feature which eliminates handling of the bait. This new rodenticide has been tested in 44 Illinois counties. National distribution is planned to start Jan. 15. Larry Mayne, advertising director, in charge.

Boyle-Midway, Inc., New York, made their first public showing of "Ritz," an indoor dog repellent, in a 5-oz. aerosol container; also a new aerosol, "instant leaf shine," for touching up broad leaf plants in window boxes or other interior locations. Among new products introduced during 1957 are a weed killer, crab grass killer, garden spray, and other items.

Henry G. Andersen, midwest sales representative, Chicago, commented on the growing demand in his territory for "Snarol," a chemical bait in meal or pellet form, for slug and snail control.

This product, on the market for over 15 years, heretofore has been sold chiefly in the west and southwest. Now, Mr. Anderson said, it is being bought in volume by greenhouse and and nursery operators in the midwest, which may indicate he pointed out, that this pest is migrating eastward. In general charge was Tom S. Blankely, sales manager of the Antrol division.

Faesy & Besthoff, Inc., New York, showed more than a score of insecticides, fungicides, herbicides, fertilizers and specialties, such as a rabbit, dog and deer repellent. New plant foods in consumer packages included a 4-12-12 formula for tomatoes,

(*Continued on Page* 106)

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LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Control of Celery Anthracnose

R. S. Cox[2] reports the observation, at the University of Florida Everglades Experiment Station, of anthracnose, a hitherto unnoticed disease of celery caused by a species of *Colletotrichum*. He states that the presence of anthracnose might, very probably, have remained unrecognized except for the fact that it differs from the common celery diseases in its reaction to control chemicals.

This differential response is well shown in Table 2, which gives results obtained in tests with various chemicals and combinations of chemicals for control of anthracnose and early blight *(Cercospora apii)*. The tests were conducted in commercial celery seedbeds, 300 feet x 4 feet, divided into plots 10 feet x 4 feet; with four plots in randomized blocks being used for each treatment. Kilgore's Florida Green Pascal variety was planted July 12, 1956. Twenty applications, at the rate of 10 gallons to the full 300-foot length, were made between August 31 and October 26.

Of the materials tested, tribasic copper sulfate gave best control of anthracnose but was less effective against early blight. On the other hand, Parzate, which is considered to be very effective against early blight in seedbeds, gave only moderate control of anthracnose.

The response of anthracnose to Thylate and Parzate is of interest. (In the table these materials are listed in combination with Agrimycin, which was not believed to have a significant effect according to the author, and was ignored in his discussion.) Thylate alone was not very effective (disease index 3.8), and Parzate by itself was only moderately so (index 2.8). In combination, however, the two materials gave almost perfect control (index 0.2). Synergism is the inescapable conclusion.

[2]R. S. Cox, "Anthracnose, an undescribed disease of celery in the Everglades," Plant Disease Reporter, vol. 41, no. 9, pages 790-793. Sept. 15, 1957.

Captan and Arasan for Corn Seed Protection

PAUL E. Hoppe[1], of the Crops Research Division, Agricultural Research Station, Agricultural Research Service, United States Department of Agriculture, cooperating with the University of Wisconsin, reported results attained with captan 75 (Orthocide) and Arasan 75 as protectants for corn seed in cold tests. The chemicals were applied at the rates shown in Table 1, to sound new seed of a standard hybrid and to similar seed that had been wounded at the crown to expose the starch underneath the seed coat.

Seed was placed in contact with muck soil in towels for cold testing by the rolled towel method. Towels were kept at 50°F for 10 days, then removed to room temperature (70° to 75°F). Percentage of germination was recorded three days later. Results are shown in Table 1.

Sound seed was well protected by both fungicides at dosages of 1¼ ounces per bushel or more. At the ½ ounce dosage captan was still completely effective, whereas with Arasan germination was only 60 percent.

In the tests on crown-wounded seed the chemicals gave nearly equal protection only at the excess dosage. At smaller dosages results with the two materials were sharply contrasted. Effectiveness of Arasan decreased rapidly. Captan still gave protection at 1 ounce and remained moderately effective at ½ ounce but lost its effectiveness at ¼ ounce.

[1]Paul E. Hoppe, "A comparison of Captan and Arasan for corn seed treatment," Plant Disease Reporter, vol. 41, no. 10, pages 867-869. Oct. 15, 1957.

Table 1. Percent germination in rolled towel cold tests when non-injured and crown-wounded corn kernels were treated with Arasan 75 and Captan 75 at the indicated dosages.

Fungicide[a]	(Dosage (ounces per bushel)							
	0	¼	½	¾	1	1¼	1½	2 "Excess"
	(non-injured kernels)							
Nontreated control	13	—	—	—	—	—	—	—
Arasan 75	—	57	60	—	87	96	91	100
Captan	—	91	97	—	97	99	99	100
	(Crown-wounded kernels)							
Nontreated control	0	—	—	—	—	—	—	—
Arasan 75	—	1	7	23	42	50	58	92
Captan 75	—	12	71	83	93	98	98	99

[a]Tests in three 50-kernel replicates.

Table 2. Effect of various materials alone and in combination on the control of celery anthracnose and early blight; Belle Glade, Florida, 1956.

Treatment[a]	Concentration		Anthracnose severity[b]		Early blight
	Pounds/ 100 gallons	Ppm	October 12	October 19	
Check	—		3.9	4.5	4.5
Agrimycin-100		100	2.2	3.8	4.0
		50	3.2	4.5	4.0
		25	3.5	4.7	4.5
TBCS	4		1.0	1.0	4.2
Spergon	4		3.2	3.2	0.8
Thylate	1½		2.5	4.0	0.2
TBCS	4				
plus Agrimycin		25	0.0	1.0	2.9
Spergon	4				
plus Agrimycin		25	3.0	3.0	1.0
Thylate	1½				
plus Agrimycin		25	2.9	3.8	0.2
Parzate	2				
plus Agrimycin		25	2.0	2.8	0.0
TBCS	4				
plus Parzate	2				
plus Agrimycin		25	0.2	0.0	0.0
Spergon	4				
plus Parzate	2				
plus Agrimycin		25	2.2	2.0	0.0
Thylate	1½				
plus Parzate	2				
plus Agrimycin		25	0.2	0.2	0.0

[a]Percent active ingredient of materials tested as follows: Agrimycin - 100, 15 per cent streptomycin sulfate, 1.5 per cent Terramycin; TBCS (tribasic Copper Sulfate), 53 per cent metallic copper; Spergon, 50 per cent chloranil; Thylate, 65 per cent thiram; Parzate, 65 per cent zineb.
[b]Scored on a 0-11 basis where 11 equals complete defoliation.

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

Grasshoppers Still Active in October

ALTHOUGH the principal grasshopper activity was over by early September, some trouble was still being experienced in October. In Nevada *Schistocerca* grasshoppers were more numerous in the Moapa and Virgin Valleys of Clark County than they were in 1956. Margins of many wheat fields in northeastern Colorado and the Oklahoma Panhandle were damaged seriously in October. Injury was common throughout the eastern Colorado area. Damage was also reported occurring to newly emerged wheat along field margins in areas of Cloud, Clay and Ottawa Counties, Kansas. Grasshoppers were reported on grasses and garden crops in Alabama. In Louisiana several species of longhorn grasshoppers severely damaged late rice in Acadia, Jefferson Davis, Cameron and Calcasieu Parishes. The damage to rice in the "boot" stage resulted in deformed heads.

Over 1,700,000 acres of rangeland were treated in the cooperative program for grasshopper control during the 1957 season. The largest acreage, 651,000, was treated in Montana followed by Wyoming where about 443,000 were treated. Acreage treated in other states was as follows: California 168,000; New Mexico 122,000; Nebraska 100,000; Utah 70,000; North Dakota 63,000; Texas 49,000; Idaho 34,000; Nevada 21,000; Colorado 18,000 and South Dakota 500 acres.

Among other cereal and forage insects which were active in late October was the fall armyworm. This insect was active on hay crops in Virginia, heavy on sorghums locally in Delaware and infesting wheat and rye locally in that state. In Kansas, considerable damage was caused to wheat in Mitchell and Osborne Counties. Some early planted fields required reseeding. Sorghum and corn were infested in south central Nebraska counties with 90 to 95 per cent of the corn in the area having as high as eight armyworms per plant.

The spotted alfalfa aphid was on the increase in several states during October. There was a slight increase in spotted areas of New Mexico and some growers applied controls. Increases were noted in the Arkansas Valley of Colorado, and in local areas of Oklahoma slight increases were reported. Buildups also occurred in old stands of alfalfa in Pinal County, Arizona, and controls were applied on limited acreage. The pest was prevalent in early November in many alfalfa fields in north central Kansas.

The first report of the season for damage from greenbugs came from Alabama where light damage was caused to oat fields. Pea aphids were on the increase on alfalfa in Arkansas. In Delaware this pest was common on alfalfa in localized areas of each county of the state.

Spittlebug Survey in Ohio and Illinois

A SURVEY of adult meadow spittlebug infestations was made during September in Ohio. Infestation levels found were the highest ever recorded in the six years that these surveys have been made. Every region sampled, except the old lake bed region(the west edge of Lake Erie) had many more adults than are necessary to produce an economic infestation next year. The lake bed region

has never recorded an economic population, but this year approached that level; 0.83 adults per sweep. One adult per sweep is regarded as an economic infestation. Barring extremely unusual dry conditions during the winter and early spring, the problem could be the severest ever experienced in Ohio.

The spittlebug survey in Illinois showed a very severe infestation in Boone County. Severe infestations were found in most counties of the northern three tiers. Moderate infestations were recorded for the eastern central counties along the Indiana border. A limited number of counties in the northern part of the State recorded light populations with the remainder of the counties being non-economic.

Other Insect Activity

AMONG truck crop insects, cabbage loopers were perhaps the most active during October. In southern California, these insects were numerous and cotton, lettuce, beans and cole crops were damaged. There was considerable defoliation of beans in Orange County, and heavy infestations were recorded on cabbage and cauliflower. New Mexico reported light to medium populations of cabbage loopers on lettuce in Dona Ana, Eddy and Bernallillo Counties. The majority of growers controlled the pest with insecticides. The insect continued serious on crucifers in the eastern area of Virginia. Some difficulty in control was being experienced with the insecticide used. Damage continued to cucurbits and crucifers in some areas of New Castle and Kent Counties, Delaware. The corn earworm was damaging lima bean pods in Orange County, California, squash and peppers locally in Delaware and beans in the Norfolk, Virginia area.

Late in the month, pepper weevil was reported from the Vineland area of New Jersey, where it has caused severe damage in pepper plantings this season. This is the first known infestation of the pest north of Georgia. Whether the New Jersey infestation is of more than one year's duration is not known at this time.

It is interesting to note that screw worms were still active in Alabama and Oklahoma during October. During September screw-worm cases were reported from 16 North Carolina counties.★★

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Fire Ant Funds Available

Plans for an all-out attack on the imported fire ant in Southern States, where it has gained a firm foothold are now in the final discussion stage between Federal and State agencies. Funds for the Federal government's part in the fire-ant eradication program have been made available expressly for this purpose by Congress.

In order to stamp out the fire ant, which may take three years or more in a given area, all infested lands —regardless of ownership or use— will need to be treated, according to plant pest control officials of USDA's Agricultural Research Service. Such a united and comprehensive attack is needed to successfully wipe out the pest, since ants from untreated land could reinfest treated areas.

Treatment will be by airplane, motorized ground equipment, and hand applicators. A number of insecticides are known to be effective against fire ants, and local conditions may determine the one to be used in a specific location.

Announcement of a public hearing is expected soon to consider the advisability of a Federal quarantine.

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British Release Antibiotic

Grisovin, an antibiotic for horticultural use has recently been released by the British Ministry of Agriculture, Fisheries, and Food. The new antibiotic is produced by Glaxo Laboratories Ltd. at Barnard Castle, England, for formulation, packing, and marketing by their subsidiary, Murphy Chemical Co. Ltd. at Wheathampstead, Herts.

Grisovin is the trade name for griseofulvin. It has been found by British scientists that griseofulvin applied to foliage, becomes distributed throughout the plant, including the roots. Spread of a pathogen is prevented as the pathogen develops morphological abnormalities within plant tissues containing griseofulvin and becomes unable to pass from cell to cell through the plant membranes.

A trial carried out on strawberries showed promising results against grey mould. Grisovin showed promise against tulip fire and a number of trials were carried out on lettuce for the control of grey mould, using griseofulvin both as a 3 per cent dust and as a 3 per cent atomizing concentrate (aerosol) and promising results were obtained.

Apple Insect Control

Material/100 gals*	Percent fruit infestation by: codling worms	moth stings	red-banded leaf roller	plum curculio	Percent clean fruit
Sevin 2 lbs. 50W	0.5	1.0	0.5	0.4	97.4
DDT 2 lbs. 50W	3.0	1.4	5.7	0.6	89.4

*5-spray schedule applied to single tree replicates.

Control of Mexican Bean Beetle on Green Beans

Treatment	Lbs. actual per acre*	Mexican bean beetle larvae per plant July 2	Mexican bean beetle injury. July 2
Sevin	.75	0	1
Thimet	.75	1.2	2
Guthion	.75	.9	2
Thiodan	.75	4.5	3.5
Niagara 1240	.38	6.1	3.5
Di-syston	.75	6.6	3.5
Untreated check	—	29.7	5

*Injury classes: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.
*Insecticides applied May 31 and June 10.

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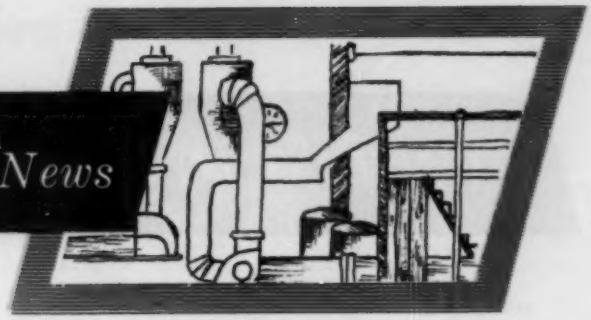
Fertilizer Views and News



The first in a series of releases prepared by the technology department of the National Plant Food Institute which will continue this column for our fertilizer readers.

Field Experiments Prevent Waste

IS it a problem of increasing yields, or introduction of a new fertilizer, or the quality of crops or a new or modified rotation? The best way to solve it is by a carefully planned program of field experiments. Experience of agricultural workers in all countries emphasizes that such field experiments provide the most acceptable basis for judgment—nothing else can take their place.

Greenhouse and laboratory studies have their place as preliminary phases. They can help in getting certain leads that are useful in organizing the field tests. But laboratory and greenhouse facilities cannot reproduce exactly the many diverse factors which prevail in the open fields, any of which may critically influence the manner in which a chemical or cultivation treatment or crop variety performs. Laboratory tests of soils, unless closely correlated with field experiment results, can often give misleading, costly information. Hence, the only satisfactory method of finding our answer to the farmer's question—What can one expect of a certain treatment in practice?—is to carry out a good program of statistically designed and appraised field experiments.

These thoughts were jotted down after reading a most interesting paper* on how some so-called technically backward countries have planned and conducted comprehensive programs of field experiments as a basis for fertilizer recommendations. For example, in India field experiments on a large scale in several regions indicated that nitrogen gave a fairly constant response if water was adequate and it paid to recommend a general small application. All farmers doing this would get a profitable return and the fertilizer would not be misused. Also, it had been generally held in India that it did not pay to use phosphate; but a series of well-planned experiments showed regions where phosphate was critical and paid handsomely when applied and it was not wasted where it was not required.

Agricultural China is another example. A series of factorially designed field experiments were carried out throughout central and western China during the last World War years. The results have been used to recommend profitable usage of fertilizers on many crops.

Similar large scale field experiments designed along modern statistical lines have been carried out in Kenya and the Gold Coast with equally satisfactory results.

It is safe to say few of the large, technically advanced countries have made such a major systematic attack as these on soil fertility problems to determine the best fertilizer ratios and rates. Perhaps these countries having a long tradition of fertilizer usage think they know the answers without the extensive field trials. One thing they fail to consider in their complacency is that the nutrient status of a soil is constantly changing, and that what was true twenty or thirty years ago is not true today. New fertilizer materials and new crop varieties have been developed and are now in use which require a new "look-see" regarding fertilizer usage. A region, for example, where fertilizer ratios high in phosphorus have been traditionally used for a generation may today be more in need of relatively higher quantities of nitrogen and potash and perhaps some trace elements. There is need in all regions for a continuing program of field experiments or repeat work on a smaller scale every decade or two in order to become aware of major changes that occur. A soil's nutritional status is not static. Unless this is realized, the chances favor inefficient and perhaps wasteful use of fertilizers.

*Outlook on Agriculture, Vol. 1, No. 3, 1956.

Agriculture Needs Many Recruits

JOB opportunities in agriculture offer tempting rewards to young men and women. The demand in almost every section of the country for college graduates in agriculture exceeds the supply. At the same time, it is true that farm population is decreasing and the need for young folks on the farm is also decreasing. The related agricultural industries have been increasing and expanding rapidly. It is this "agribusiness" sector of the giant agricultural industry that offers unlimited opportunities to qualified persons.

According to recent surveys of the American Association of Land-Grant Colleges and State Universities, every segment of agribusiness has attractive positions to be filled by properly trained persons. These colleges and universities expected to supply 8,500 graduates in 1957, but the openings are for 15,000. Available positions exist for 1,000 graduates in agricultural research, 1,500 in farm services and vocational agricultural teaching, 1,000 in various conservation services, 3,000 in industry, business and education. Men are needed to inspect, grade and market farm products. The demand for trained people to sell fertilizers, feed and agricultural chemicals is especially heavy.

WASHINGTON REPORT

By Donald Lerch

FUTURE generations may look upon the Russian satellites as shots that really were "heard around the world." At least nothing, short of war, has electrified Washington to such an extent. As each day passes, you can feel the mounting pressure and a sense of urgency descending upon the Capitol. Businessmen, scientists, our nation's senior and junior advisors are shuttling in and out of the Capitol.

Agriculture will be caught in the backwash of the reallocation of the nation's money, energy and human resources. Already, agricultural leaders are fearful that some of agriculture's basic programs will be cut. While most admit there is some fat on the agricultural budgets which can be trimmed, there is growing concern over research itself.

This may seem to be a paradox, for certainly our nation is committing itself to investing more money for research. However, a nation plagued with agricultural surpluses could well decide that now is the time to reduce the money spent for what is officially called "production research."

For some time unofficial and unguarded statements of some USDA officials have indicated the Department is becoming sensitive to multimillion dollar appropriations for research in the face of surpluses. The question is rightly raised by critics of the Department and by members of Congress.

While officially the Department still backs production research, there are strong indications that this matter is under review inside the Department. A series of off-the-record meetings is being held to discuss this whole question of production research. Out of these meetings recommendations may go to the Secretary on what the Department's position should be when appropriations requests are made to Congress. Undoubtedly the Bureau of the Budget will be ordered by the White House to cut Departmental requests for appropriations drastically. While each Department has the opportunity of asking for more funds from Congress, a cut by the Bureau of the Budget is hard to "upgrade."

So, Dr. Byron T. Shaw, head USDA research man, may face the battle of his career. According to a recent analysis of the value of research—if farmers farmed in 1950 as they did in 1940, the American housewife would pay 10 billion dollars a year more for food. Some agricultural leaders have up-dated this principle to 1957, with the finding that the savings in the consumers' food bill would undoubtedly be 13 instead of 10 billion dollars annually. In terms of appropriations, the 10 billion dollar annual saving which the American farmer has passed on to the consumer pays for twice the entire USDA annual appropriation.

There are hundreds of examples of the value of agricultural research, and it may well be that considerable study on this matter must be done and presented to Congress and the public in order to justify a continuation of federal money for agricultural research.

The entire agricultural chemicals industry has a tremendous stake in the outcome of this budgetary decision on research appropriations. Probably in no other area is there so much industry endorsement of the use of government money. Immediate investigation by industry associations and leading companies may well be in order. Agriculture probably will be forced to yield on several fronts, but research should not be one of them.

* * * * *

The research climate in entomology has been undergoing change, with the outcome still in doubt. There's a tendency on the part of government officials to lump entomological functions with other activities and to transfer the entomological aspects of certain work to other fields of science.

Two examples illustrate this point. One, the recent formation of the Field Crop, Insect, and Bee Culture Research Branch. With this one swoop, three separate and distinct lines of work have been combined. Perhaps this will make for greater efficiency. On the other hand the shock of consolidation may handicap the work for some time to come.

A second example is the transfer of the entomological function in the 1.6 million dollar screw worm control program from the jurisdiction of the entomologists to the animal disease control people. This work is headed by Dr. R. J. Anderson.

A more detailed breakdown on cotton insect work has been made by the government into a Cotton Insect Branch headed by Dr. C. F. Rainwater at Beltsville, and a Pink Boll Worm Program with Dr. D. F. Martin in charge at Brownsville, Texas. Observers here note the continuous churning in entomological appointments and in the administration of the science itself.

* * * * *

There may be more than meets the eye in the pesticide labelling pro-

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TECHNICAL SECTION

Thimet For Alfalfa Aphid

Thimet, a systemic insecticide that has been successfully used in protecting young cotton plants against insects, can now be applied with similar results to alfalfa, according to the American Cyanamid Co., New York.

The U. S. Food and Drug Administration has approved the use of Thimet for protection against the spotted alfalfa aphid.

Thimet is applied to alfalfa seed by processors using special seed treating machines. This protection against the spotted aphid lasts up to six weeks after which the Thimet breaks down in the plant and leaves no residue in storage. However, as an extra safety measure the U. S. Department of Agriculture requests that an additional 60-day period elapse before livestock are permitted to graze on the treated alfalfa.

The importance of the application of Thimet to alfalfa seed is emphasized by U. S. Department of Agriculture estimates which place annual losses from the spotted alfalfa aphid at several million dollars.

•

Nematode Resistant Tomatoes

Warren S. Barham and Nash W. Winstead of the North Carolina Agricultural Experiment Station, Raleigh, have initiated studies with tomato plants to determine the inheritance of resistance to nematodes occurring in North Carolina.

Tomato breeding lines developed at the Hawaii and Texas Experiment Stations were found to be resistant to four species of root-knot nematode which are known to occur in North Carolina.

Results of the studies indicate that resistance to the four species is controlled by an incompletely dominant gene. However, an F_1 hybrid between nematode resistant and susceptible lines has enough resistance to perform well in soils heavily infested with one or more of these nematodes.

•

Dowlap For Lamprey Control

Dowlap, a chemical developed to control sea lampreys by the Dow Chemical Co., Midland, Mich., was tested last month by the Great Lakes Fishery Commission on a stream near Cheboygan, Mich.

Indications were that the final kill of lampreys would top 95 per cent. The effect of the chemical on trout and other game fish was negligible in the tests, which are continuing.

New Tomato Hormone

A new tomato hormone that increases the size and set of tomatoes is now available from Miller Chemical & Fertilizer Corp., Baltimore, Md.

This new hormone spray, being offered by Miller under the trade name "tomato set" was developed by Dr. E. M. Emmert at the University of Kentucky Experiment Station.

Research work has demonstrated that this new hormone spray can be applied over the entire plant as a broadcast treatment without injury to the tomatoes. A combination of boron and the synthetic hormone, Miller Tomato Set, is packaged in an eight ounce bottle for growers.

Fertidyne Soil Treatment Said To Increase Crop Yield

IBC Research Laboratories, Inc., New York, has announced the availability of a new plant growth stimulator, Fertidyne, an organic compound of very high molecular weight.

The active ingredient in Fertidyne is beta amylose triodide. In the majority of field tests conducted on various soils and crops, Fertidyne-treated crops showed a substantial and profitable increase in yield and/or nutritive value of produce, according to IBC Laboratories. Fertidyne is said to stimulate the natural processes and agencies which dissolve mineral grains and fertilizer residues in soils to free important plant nutrients and trace elements.

Fertidyne can be applied to the soil in a solution with water, as a powder, or mixed with fertilizer. It should be applied to the soil before the crop is planted and is applied at the rate of one pound per acre.

Figures released by the IBC Laboratories state that the new product, when applied at the recommended rate, increased the release of available nitrogen by 33 per cent, phosphorus by 50 per cent, and iron by 61 per cent.

Results of tests performed in different parts of the country indicate that the use of Fertidyne increases yields. On a sandy Long Island soil its use increased the yield of strawberries 69 per cent. On a poor limey soil in New York State, the yield of tomatoes was increased by 120 per cent, while on a favorable sandy New Jersey soil, the yield of tomatoes was increased 60 per cent following the use of Fertidyne. Tests on cucumbers produced triple yield, tests on peppers produced more than double yield, and tests on radishes produced a 100 per cent yield increase.

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Although "mighty midgets" represent higher concentrations, they cost less than conventional aerosols of equal killing power. They exhibit no greater staining characteristics either. The reason is obvious: the single active ingredient is Improved Pyrenone*. And, of course, when used as directed Pyrenone is *nontoxic*.

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Antibiotic Patent To DuPont

E. I. du Pont de Nemours & Co. recently received a patent for a new antibiotic effective against plant diseases. It is known so far simply as agent 1-81-d-1s, its laboratory code name.

Edward C. Hermann, Lester M. Larson, and William A. Price, Jr., developed the substance and process for the Grasselli Chemicals department of du Pont at Wilmington, Del. They say it is particularly effective against certain fungi that cause early blight of tomato plants, bitter rot of apple, and withertip of twigs.

Early blight was controlled by spraying tomato plants with a composition containing agent 1-81-d-1s in a concentration of 80 parts per million or less. The inventors also call it effective against the cause of musty and other off-flavors in beer, and against certain costly diseases of wheat, barley, and corn.

The company is continuing to work with the antibiotic but so far has made no plans to put it on the market. The patent number is 2,805,185.

•

Dowicide A For Peaches

The Food and Drug Administration has recently established a tolerance for residues on peaches, of Dowicide A which retards surface mold, brown rot and rhizopus rot.

Dowicide A already is being used commercially on grapefruit, kumquat, lemons, limes, oranges, apples, pears, tangerines, citrus citron and tangelos and has been cleared for pineapples.

Treatment will permit peaches to be shipped greater distances and they will remain in good condition longer than before.

•

Hope For Botfly Control

Recent tests by the U. S. Department of Agriculture indicate that the nasal botfly of sheep may some day be effectively controlled through the use of Dow ET-57, a synthetic insecticide.

Although it appears to be effective, Dow ET-57 is not yet recommended by the department for general use against sheep nose bots. In New Mexico, where the tests are continuing, an estimated 90 to 95 per cent of adult sheep are infested with nasal botflies at some time in their life.

A single treatment with Dow ET-57, administered orally with a dose syringe, was 100 per cent effective in killing the first instars in all treated animals except one. The same treatment killed 60 per cent of the second instars, but appeared to be ineffective against the third instars, or more fully grown larvae.

Since the first instars usually are in greatest numbers during late fall and early winter, application of Dow ET-57 would be most effective at that time.

•

Control of Weeds in Corn

In field tests conducted by the University of Minnestoa this spring and summer, a mixture of the chemicals Randox and 2,4-D ester, when applied as a pre-emergence "band" spray, controlled weeds so well that in some cases it was possible to eliminate one cultivation later on.

The 2,4-D was applied at one-half pound per acre while Randox was tried at 4,5, and 6 pounds per acre. In general, the heavier applications of Randox gave better control. Equally good results were obtained when the spray was broadcast.

•

Test Sevin on Vegetables

The Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, annouces that Sevin, an experimental insecticide, is being tested on beans and potatoes.

Sevin is a carbamate (1-naphthyl N-methyl-carbamate) and differs from insecticides now in common use, such as the phosphates, chlorinated hydrocarbons, arsenicals, and fluorides. Toxicity of Sevin to warm-blooded animals is reported low.

Agricultural experiment station scientists in more than 20 states are conducting tests with Sevin experimental insecticide on vegetables. Many others are testing the new chemical on apples, pears, peaches, grapes, cotton, tobacco, forage, citrus, and ornamentals. It has given good residual action in many experimental applications.

Fungus Control On Citrus

In tests conducted at the Citrus Experiment Station, Lake Alfred, Fla., during 1953 and 1956, ferbam, captan, and zineb were used in citrus nurseries to control two fungus diseases, scab and anthracnose, on lemon seedlings.

Copper-containing fungicides have been found to give a fair measure of control but their long continued use leads to toxic accumulations of copper in the soil which in turn results in poor plant growth.

The results of the tests indicate that weekly applications of ferbam at the rate of 1½ to two pounds per 100 gallons is the most effective treatment known so far for the control of anthracnose and scab on rough lemon nursery stock. There were fewer plants with dead terminals in ferbam-treated plots than in all others, although all fungicides gave some protection.

•

New Antibiotic Found

The discovery of a new antibiotic called flavensomycin—effective in killing both fungi and insects—has been reported by Dr. R. Craveri and Dr. G. Giolitti of the Montecatini Antibiotic Research Laboratories, Italy.

In tests of the new antibiotic's insecticidal properties, flavensomycin proved to be 10 times more effective than DDT against the common house fly, according to the researchers, who also found that the drug is effective in killing migrating locusts.

Describing their findings in the British scientific journal, *Nature*, the scientists explain that they found flavensomycin while investigating Streptomyces. Purified flavensomycin consists of pale yellow, odorless tabular crystals with a melting point of 152 degrees centigrade. It is soluble in water, lower alcohols and acetates, benzene, pyridine, acetone, dioxane, and propylene glycol and insoluble in ether, petroleum ether, hexane, carbon tetrachloride, and carbon disulphide. It contains nitrogen but no sulfur or halogens and gives some reactions associated with carbohydrate but not with protein components.

Lettuce Pest Control Tests

Tests were conducted at Queen Creek, Ariz., in 1956 on controlling the cabbage looper on lettuce. Applications of the insecticides were made with a tractor-mounted sprayer which was calibrated to spray 10 gallons per acre at a pressure of 60 p.s.i. when traveling at five m.p.h.

Results indicate that toxaphene did not give satisfactory control at a dosage of either two or four pounds per acre. The Toxaphene-DDT combination of four pounds and two pounds per acre was more effective than the Toxaphene-DDT combination at two pounds and one pound, respectively, per acre. The lower dosage of the Toxaphene-DDT combination was more effective than either Toxaphene or DDT applied separately. DDT applied at one pound per acre was unsatisfactory but at two pounds it served well against young larvae, but was less effective than the stronger combination of Toxaphene-DDT and somewhat more effective than the weaker combination of these materials.

A Malathion-Perthane combination at the rate of one pound of each per acre was outstanding. It killed the larger larvae, and gave a higher percentage of control than any other insecticide or combination of insecticides tested.

"Field Tests of Insecticidal Sprays for Control of Cabbage Looper on Lettuce," by F. F. Bibby, Arizona Fertilizers, Inc., Phoenix. *Journal of Economic Entomology*, Vol. 50. No. 1, pages 101, 102. Feb. 1957.

•

Fly Resistance Studies

Adult *Calandra* of the same age but some reared from a wild strain, and the others from a laboratory strain were used in tests with pyrethrin powders. The laboratory strain was found to be between 3½ to 6½ times as susceptible to pyrethrins as the wild strain, which was not appreciably less susceptible to synergized pyrethrins (pyrethins and piperonyl butoxide) than was the laboratory strain.

Several strains of adult *Tribolium* of the same age showed a difference in susceptibility to gamma-BHC, pyrethrins and to a lesser degree, synergized pyrethrins. These strains were developed from cultures from different laboratories.

Gamma-BHC was found to be 4 times, and pyrethrins 3½ times more effective against the most susceptible strain of *Tribolium* than against the least susceptible strain.

Differences in susceptibility are believed to be due to difference in vigor. J. M. Holborn. *J. Sc. Food & Agr.* 8, No. 3, 182 (1957).

•

Grape Berry Moth Control

Experiments conducted in Erie County, Pa., from 1952 to 1956 indicate that there are several insecticides that may be used to control the grape berry moth under field conditions.

DDT was outstanding for the control of the insect. A spray program of three applications of DDT, at the rate of 12 ounces to 100 gallons, gave excellent control.

Split schedules of DDT and parathion, DDT and EPN, or DDT and methoxychlor gave results comparable to those obtained with a straight program of DDT. In the split programs, DDT was used in the after-blossom and 10-day sprays and either parathion, methoxychlor, or EPN in the last spray. Split programs appeared to be more satisfactory than a straight schedule of DDT in that the spray residues were not a serious problem at harvest.

Parathion and EPN were tested for several seasons and gave excellent control. Although these materials offered protection for a relatively short time, they appeared to be equally as effective as DDT under field conditions.

Methoxychlor was quite toxic to grape berry moth.

Perthane and Dilan gave promising results but further tests are necessary. Diazinon and Guthion were also quite effective.

Insecticides for Control of Grape Berry Moth by James A. Cox. Pages 455 to 457. *Journal of Economic Entomology*, Volume 50, No. 4, August, 1957.

LITERATURE AVAILABLE

The following list reviews a series of bulletins on fertilizer, insecticide, and fungicide recommendations, controls, etc. These bulletins and reports are prepared by agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

FARMS ARE GROWING LARGER, by M. L. Mosher. A 44-page bulletin pointing out some implications of the trend towards larger farms in Illinois and the United States as a whole. The report discusses the relationship of the size to the efficiency of farms and gives some implications of the growth in farm size.

WHAT'S NEW IN FARM AND HOME PUBLICATIONS FOR KANSAS? A folder issued by the Kansas Agricultural Experiment Station and Extension Service, Kansas State College, Manhattan, Kans., listing farm and home publications available from the station.

INSECTS IN FARM-STORED WHEAT, HOW TO CONTROL THEM. A leaflet describing steps to be taken to keep pests away from stored wheat on the farm. The booklet discusses dry storage, chemical protection, and fumigants. Leaflet No. 345. U. S. Department of Agriculture, Washington, D. C.

STATISTICS ON FERTILIZERS AND LIMING MATERIALS IN THE UNITED STATES by A. L. Mehring, J. Richard Adams, and K. D. Jacob. A bulletin bringing together in one place comprehensive statistics of fertilizer production, consumption, foreign trade, and kindred topics as they relate to the United States. Statistical Bulletin No. 191, United States Department of Agriculture, Washington, D. C.

NUTRITION AND SOIL MANAGEMENT STUDIES by H. Hill and H. B. Heeney. A collection of studies reprinted from the Progress Report, 1949-53, of the Horticulture Division, Central Experimental Farm, Canada Department of Agriculture, Ottawa.

REDUCING LOSSES FROM SOUTHERN FUSIFORM RUST by J. F. Goggans. An illustrated booklet listing steps which can reduce losses caused by southern fusiform rust on slash, loblolly, and longleaf pines in Alabama. Leaflet No. 54. June, 1957. Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, Ala.

POSITIVE-FLOW BAND APPLICATOR FOR GRANULAR SOIL INSECTICIDES by Harry Andison. An eight-page booklet describing an applicator which applies toxic dusts accurately to the soil at 200 pounds or less per acre. Publication 916. Canada Department of Agriculture, Ottawa.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 12

Nitrogen Division Tells Millions of Farmers . . .

THE BEST FERTILIZERS ARE MIXED FERTILIZERS

The powerful Nitrogen Division advertising campaign which started last fall will continue during 1958 to urge farmers to purchase their plant food in the form of mixed fertilizers.

The poster pictured below will soon appear in hundreds of locations in leading farming areas. It will be seen by millions of farmers at the time when they are considering the purchase of fertilizers for their 1958 crops.

Nitrogen Division, Allied Chemical, produces and sells nitrogen. But, Nitrogen Division has always aggressively supported the importance of using nitrogen in a balanced fertilizer program.

We trust that this campaign is helpful in increasing your sales and in stimulating your customers to place their orders early.

We will keep you posted on our continuing efforts to help you sell mixed fertilizers as this campaign unfolds. In the meantime, we will appreciate your comments and suggestions. Just write to: Nitrogen Division Allied Chemical, 40 Rector Street, New York 6, N. Y.

THE BEST
FERTILIZERS ARE
MIXED FERTILIZERS
Buy Yours Now!
NITROGEN DIVISION, ALLIED CHEMICAL · SUPPLIERS OF NITROGEN TO THE FERTILIZER INDUSTRY

Enduring Nitrogen Expands Non-Farm Fertilizer Market

Don't fail to look now at the fertilizer market that is growing right in your backyard. It is in every backyard and front yard—around the homes, factories and other structures sprouting up along our streets and highways. It's hard to measure this market accurately, but there is no question it is growing faster than the farm market.

In 1938, the U.S. Department of Agriculture estimated non-farm fertilizer use at 250,000 tons. By 1957, the estimate is up to 2¾ million tons, half of this being fertilizer for home lawns and grounds. By 1965, our 27 million home units are expected to grow into 35 million homes, with a corresponding increase in fertilizer use. We have all heard that the new Federal highway program will call for a million acres of roadside turf. Parks, playgrounds, golf courses and the like now occupy about 3 million acres, mostly turf. About 14 million acres of tended turf are now getting fertilizer, or need it. And we'll have more soon.

And around our million new homes a year, along our new highways, around our modern factories, and in our parks and playgrounds, we like to see grass, shrubs and trees. And we want them to look good, not tired and bedraggled. We are beginning to realize that fertilizer helps make plants attractive.

This is keeping the plant nurseries, lawn seed and sod producers busy. There is no reason it can't bring you fertilizer business too, at a good profit.

One big farm supply firm in the Northeast has been selling farm fertilizers for years to the home owners who have flocked to the outskirts of the towns. Now they have big garden centers catering to this trade. And the special fertilizers they make and sell are designed for turf, trees and shrubs.

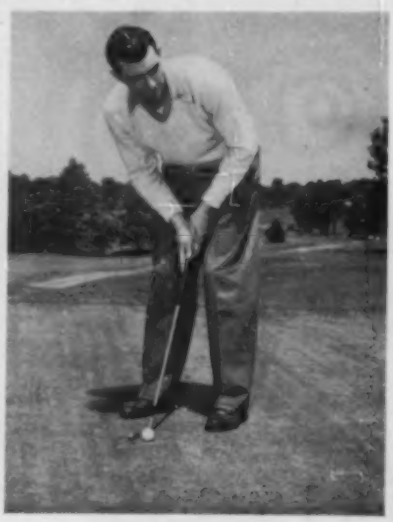
Over the years, fertilizer men have often talked about the wonderful market in farm pastures, if they could only get farmers to fertilize grass. Usually the fertilizer goes largely to cash crops. But grass around a home is different. Nowadays a new home costs money. The grass and shrubs and trees around it are expensive, too. Home owners are inclined to protect this investment and see it grow. They will use fertilizer to keep their plantings alive and to make them thrive. These customers need help in picking their fertilizers. Give them the right products—mainly mixed fertilizers high in nitrogen—and tell them to use enough, and you'll build satisfaction and repeat business.

When new turf is established, most of the experts recommend a 1-1-1 ratio, or something close to it. For repeat applications, turf experts are recommending 2-1-1, 3-1-1, 4-1-2, 3-1-2, 3-2-1 and other high-nitrogen ratios.

In addition, the experts are advising that fertilizers for lawns and ornamentals contain a large proportion of slow-release or long-lasting forms of nitrogen such as ureaform. This allows the home owner to apply fertilizer only twice a year and still get fairly steady growth throughout the seasons. Fertilizers made with "N-dure" are ideal for this growing market.

Nitrogen Division research has perfected the combination of N-dure urea-formaldehyde solution and urea for manufacturing fertilizers that make nitrogen available to plants at a uniform rate for months. Manufacturers can use their standard ammoniating apparatus and can produce chemically controlled mixed fertilizer at economical cost. N-dure urea-formaldehyde solution, with additional urea, builds ureaform during the manufacturing process. This produces excellent semi-granular, non-segregating fertilizer. Formation of ureaform in the process of mixing also helps reduce danger of burning from other fertilizer salts as well as from nitrogen.

You can easily control the ratio of long-lasting to quick-acting nitrogen by using N-dure and urea in standard ammoniating equipment. Mixed fertilizers can be made with a wide variety of plant food ratios. For specific details on how N-dure can help you make profits in the 1958 specialty fertilizer market, write Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.



Technical Tips For Better Ammoniation

New nitrogen solutions now available for ammoniating superphosphate enable you to maintain excellent production schedules in the manufacture of high-quality fertilizers. However it is necessary to observe certain basic precautions in ammoniation.

The urge to hold output at too high a level can result in production losses rather than production gains. For example, overloading the mixer is a common cause of difficulty. It's better to stay within the capacity of the mixer.

Care should also be exercised in the selection of superphosphate for ammoniation. Coarse 4- to 6-mesh superphosphate is too large for complete ammoniation. 16-mesh and finer superphosphate assure better ammoniation and permit the use of a greater quantity of low cost solutions. Low moisture content makes it difficult for superphosphate to absorb desired amounts of ammonia.

Superphosphate will absorb more ammonia in the early stages of the ammoniation cycle than in the later stages. The charging rate should therefore be tapered off to prevent waste and assure complete reaction, in both batch mixers and continuous mixers.

With a 55-second ammoniation cycle in a batch mixer, the rate of adding solution should be gradually slowed down from 1 pound of ammonia per unit of P_2O_5 in the first 5 seconds to 1 pound of ammonia per unit of P_2O_5 in the last 10 seconds.

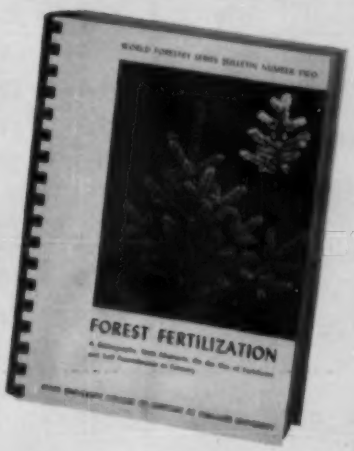
In addition to avoiding escape of nitrogen, this tapering-off technique also helps prevent reversion of phosphate to a non-available form, especially where high temperatures are involved. When reversion occurs, the fluorine tends to recombine as fluor-apatite, a form of phosphate with low availability to crops similar to rock phosphate before acidulation. When ammoniation is gradually tapered, the fluorine in the mixture tends to form desirable calcium fluoride instead of fluor-apatite.

The gauge is your guide to the flow of ammoniating solution into a batch mixer. For accurate control of this flow, it is important to keep the gauge glass clean and to maintain sufficient pressure in the tank to prevent gas bubbles in the gauge. To facilitate control in continuous mixers, meters must be kept in good working condition, free of dust and corrosion.

Ammoniation rates can be affected by the condition of the spray pipe that introduces solution into the mixer. Flow is reduced when orifices in the pipe become plugged. Flow is increased when orifices are enlarged by corrosion. Frequent checks are necessary. These can be made without opening the mixer for visual inspection. When the mixer is overhauled, or a new spray pipe is installed, simply take an accurate reading of the time and pressure required to deliver a standard charge of solution. Follow this with periodic readings, using the same pressure. If you note a change in time required for charging, examine the spray pipe. Stainless steel pipe is a real economy because it resists corrosion far better than mild steel.

Efficient ammoniation involves proper techniques, equipment and materials. Nitrogen Division, Allied Chemical, offers a complete line of nitrogen solutions from which you can select those best suited to your operating conditions. Nitrogen Division technical men are experts in ammoniation and have a thorough knowledge of fertilizer plant operation. Their service is free to customers. Contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y. Phone Hanover 2-7300.

Forest Fertilization Studies Summarized



A new technical book is now available which summarizes benefits of fertilizing trees and provides information that is helpful in determining the various tree fertilization markets.

Forest Fertilization, published by Syracuse University after two years of compiling information from forestry experts all over the world, is a bibliography, with abstracts, on the use of fertilizers and soil amendments in forestry.

This authoritative work is contained in one volume of 300 pages. Its 700 abstracts are clear and concise, and they cover all known test responses of trees to fertilizer from the year 1865 through 1956.

Tests described in the book include all important classifications and phases of tree production, such as natural forest stands and plantations, forest nurseries, and shade trees for landscaping.

The new book will save much repetition of work for anyone conducting experiments in tree fertilization, and will prove valuable as an information source to companies and individuals interested in this important fertilizer field.

Compilation of *Forest Fertilization* was sponsored by Nitrogen Division. Copies of the book can be obtained at $3 each from Director of Research, Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

HERE'S THE BIG LINE OF Arcadian NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

NEWS about the TRADE

Heads Northwest Nitro

Howard L. Sanders, vice president and treasurer of Commercial Solvents Corp., New York, has been named president of Northwest Nitro-Chemicals, Ltd., the Canadian agricultural chemicals affiliate of CSC which is located at Medicine Hat, Alberta.

Mr. Sanders succeeds Thomas L. Brook, who has resigned to resume full time duties as chairman of the board of the New British Dominion Oil Company of Calgary, Alberta.

•

Haller Heads ACS Section

Two government scientists of Washington, D.C., will head divisions of the American Chemical Society in 1958. They are Dr. H. W. Haller of the United States Department of Agriculture, who has been elected chairman of the Society's Division of Agricultural and Food Chemistry, and Dr. William Albert Zisman, new chairman of the ACS Division of Colloid Chemistry.

Dr. Haller, assistant to the administrator of production research in the USDA's Agricultural Research Service, succeeds Dr. D. M. Doty of the American Meat Institute, Chicago, as head of the Agricultural and Food Chemistry Division. Other officers of this division will be Professor Frank M. Strong of the University of Wisconsin, chairman-elect, and John H. Nair III of Mellon Institute, Pittsburgh, secretary-treasurer.

•

N. C. Pesticide School

The 10th annual Pesticide School at North Carolina State College, Raleigh, has been set for Jan. 21-22, 1958.

Plant pathology, weed control, and entomology will be discussed by 22 instructors and extension specialists from N. C. State College and four speakers from the U. S. Department of Agriculture.

•

Stauffer Files Patent Suit

The Stauffer Chemical Co., New York, has filed suit against the Chemical Insecticide Corp., Matuchen, N. J., for alleged infringement of Stauffer's Vapam soil fumigant patent. The complaint was filed in the Federal District Court for N. J.

•

Fertilizer Short Course

The 10th annual Fertilizer Dealers' Short Course and the 1957 Fertilizer Manufacturer's Conference will be held at Iowa State College, Ames, Iowa, on Dec. 3 and 4.

The manufacturer's conference is scheduled for Dec. 3 and the short course will be held on the 4th.

J. Long Retires From Diamond

Retirement of John C. Long, veteran salesman for Diamond Black Leaf Products, a unit of Diamond Alkali Co., Cleveland, was announced last month. Mr. Long plans to continue in the agricultural chemicals industry as a manufacturer's agent.

For the past 23 years he has been engaged in the agricultural chemicals sales field. He joined the Virginia-Carolina Chemical Corporation as a salesman in 1934. He was appointed district sales manager in 1953. When Diamond purchased V-C's Black Leaf Division in 1955, Mr. Long continued in that position.

•

New Eastern ESA Officers

At the annual meeting of the Eastern branch of the ESA (see story on page 86a), N. Turner, was elected chairman for 1958. R. I. Sailer was elected vice chairman, and B. F. Driggers, was re-elected secretary-treas.

Farm Productivity Doubles Through Improved Fertilizer Technology

THE productivity per farm worker has doubled in the past 15 years, said True D. Morse, Under Secretary of Agriculture, in a talk before the 34th annual convention of the California Fertilizer Assn. in San Francisco, Nov. 3, 4, and 5.

This rate of increase is more rapid than for industry, according to Mr. Morse who added that sound financial management by farmers is shown in the fact that the debt ratio to assets is kept low—only $1 of debt for each $11 in assets. Only about one farm in three has a mortgage, he said.

Mr. Morse predicted that a new high may be set this year in total production even though the Soil Bank took about 25 million acres out of production.

Dr. Russell Coleman, executive vice president of the National Plant Food Institute, Washington, D. C., spoke on "Agricultural Subsidy—A Partnership Affair." He said that technological advancements must continue to be applied quickly on the farm, to help balance our knotty agricultural problems. The application of technology by farmers has resulted in outstanding savings to the farmers and to the American public, Dr. Coleman said.

Dr. Coleman pointed out that the fertilizer industry has contributed materially to this increased farmer efficiency. He said that if there had been no increase in fertilizer technology and farmer use, even though all other agricultural progress had continued as it has, the American

IMPORTANT NEW PESTICIDE NOW READY FOR COMMERCIAL USE

Phosdrin®

insecticide

This new phosphate chemical gives excellent foliage insect kill even within a few days of harvest—
WITHOUT LEAVING TOXIC RESIDUES

Remarkable new Phosdrin insecticide is now available for commercial application for foliage insect control. Phosdrin insecticide, an organic phosphate, can be applied up to one day before harvest on *many* crops . . . within a few days on others, and leaves no harmful residue. It gets fast kill on insects, then rapidly decomposes into harmless compounds.

Phosdrin insecticide is available as emulsible concentrate, spray and dust. It can be applied with hydraulic sprayers, low-volume or speed ground applicators and aerial sprayers in custom applications.

Here is a list of the *all-important* crops and insects on which Phosdrin insecticide is effective:

FRUITS	apples	peaches	pears	plums	strawberries
VEGETABLES	broccoli	collards	peas		spinach
	Brussels sprouts	corn	pea vines		tomatoes
	cabbage	kale	potatoes		turnips
	cauliflower	lettuce	mustard greens		turnip tops
FIELD AND FORAGE	alfalfa	clover	sorghums		

FOLIAGE-DESTROYING INSECTS

aphids	cutworms (climbing)	lygus bugs
mites	false chinch bugs	leaf hoppers
cabbage loopers	grasshoppers	red banded leaf rollers
corn earworms	dipterous leafminers	salt-marsh caterpillars
	imported cabbageworms	strawberry leaf rollers

Endrin and Phosdrin insecticides make a perfect combination for many spray schedules. Long-lasting endrin can be used up to the recommended period before harvest . . . then Phosdrin insecticide takes over to protect the crop, in many cases even up to the day before harvest.

This season include Phosdrin insecticide in your formulations and recommendations. You'll get more customer satisfaction and confidence. Technical information is available. Write to:

SHELL CHEMICAL CORPORATION

Agricultural Chemical Sales Division
460 Park Avenue, New York 22, New York

SHELL

housewife would be paying two billion dollars a year more for food.

Fertilizer's increased use since 1940, Dr. Coleman declared, almost pays the entire cost of our agricultural surplus problem. He said that advances in fertilizer technology have reduced the farmers' cost of the plant foods themselves.

Looking ahead to 1957, with its expected increase in population, Dr. Coleman said that the fertilizer industry is obligated to sell more and more of its product, and that the American taxpayer must be told the whole story of agriculture to show that the agricultural subsidy is a partnership affair.

A panel discussion of the subject of the convention theme, "Our Partnership With Agriculture," was moderated by Dr. Daniel G. Aldrich Jr., chairman of the department of Soils and Plant Nutrition, U. of California, Davis and Berkeley. The panel consisted of Dr. George B. Alcorn, director of agricultural extension, U. of California, Berkeley; J. Earl Coke, vice president, Bank of America, San Francisco; John Martin Jr., Martin Produce Co., Inc., Salinas; and Lowell W. Berry, president of the Best Fertilizers Co., Oakland.

William G. Hewitt of Berkeley was elected president of the group to serve during 1958. He succeeds Jack Baker of Los Angeles. Other 1958 officers elected were Howard H. Hawkins, Glendora, vice president; M. M. Stockman, San Francisco, treasurer; and Fred R. Bryant, Shafter, secretary. Sidney H. Bierly of San Marino was re-elected general manager.

•

USDA Extends Time for Views

Interested persons will have until December 31 to submit views on a proposed amendment to regulations for labeling commercial pesticides, the U. S. Department of Agriculture announced recently.

This amendment, proposed on September 11, would prohibit statements in the labeling of economic poisons that would directly or indirectly imply recommendation or endorsement of the products or their ingredients by any Federal agency.

Chemico Chooses N. J. Site

The Chemical Construction Corp., New York, will build a new development laboratory in New Brunswick, N. J. which is expected to be completed in June, 1958.

Chemico's present pilot plant site is at Linden, N. J.

•

Union Carbide Elects

D. B. Benedict has been elected a vice president of the Union Carbide Corp., New York. Mr. Benedict was formerly president of the Union Carbide Chemicals Co. division. In his new position he heads the corporation's chemicals, plastics operations.

E. E. Fogle replaces Mr Benedict as president of Union Carbide Chemicals and H. D. Kinsey has been named president of the new Union Carbide Olefins Co. division. Both are former vice presidents of Union Carbide chemicals.

•

AAAS Meeting Dec. 26

The 124th meeting of the American Association for the Advancement of Science will be held in Indianapolis, Ind., Dec. 26 to 30. All 18 sections of the association will have programs and approximately 70 affiliated societies of the AAAS will participate.

Among the talks listed in the tentative program are a discussion of recent advances in biological and chemical control of plant and animal pests and a review of some unsolved problems in biology.

Headquarters hotel for the meeting will be the Claypool.

U. S. Borax Dedicates Open Pit Mine and Refinery

THE United States Borax & Chemical Corp., Los Angeles, last month dedicated its new open pit mine and refinery at Boron, Calif., in the Mojave Desert 130 miles northeast of Los Angeles.

The mine and refinery represent a $20 million investment and two years of construction. Covering approximately 80 acres, the new facilities are located at the site of the largest deposit of sodium borate known in the world.

More than 3,000 persons, including special guests, the general public, and company employees from U. S. Borax, Los Angeles, Anaheim, and Wilmington were on hand to participate in the dedication activities.

Some 9 million tons of earth had been removed in digging the open pit to the ore deposit at a depth of 137 feet. This is the first time borax has been mined by the open pit method, which allows for a virtual 100 per cent recovery of ore.

Under Secretary of the Interior Hatfield Chilson spoke at the dedication and said that the remarkable vigor shown by the borax industry seems destined to continue.

James M. Gerstley, president of U. S. Borax, threw a switch setting off a blast in the open pit to signal the start of full-scale mining of the ore. Joining Mr. Gerstley in the dedication ceremonies were Mr. Chilson; Lt. Gov. Harold Powers of California; Brig. Gen. Marcus Cooper, commander of the Air Force Flight Test Center at Edwards Air Force Base; and Capt. W. C. Fortune, Bureau of Aeronautics general representative, western district, Department of the Navy.

Here's how Spencer Chemical Company makes sure of

Top-Flight Equipment for

. . . and "on-time" delivery is only one of the advantages you get from Spencer's maintenance program!

Checking each car's personal history is an important part of Spencer's maintenance program. Here, Elmer Palmer (on ground), superintendent of railway cars at Spencer's Jayhawk Works, begins a check of a car against its central control sheet.

The way Spencer Chemical Company "babies" tank cars comes as quite a surprise to many people—but this program of constant care and maintenance is the big reason you can be sure of fast, dependable service when you order SPENSOL!

Since every tank car is kept in like-new condition, Spencer can give you hurry-up service on loading and shipping, as soon as your order is received. But that's not all!

You don't have to worry about your shipment of SPENSOL being side-tracked en route because of mechanical troubles.

Since every car is kept in top-flight condition, SPENSOL shipments arrive on the date you specify, with no time lost by breakdowns.

Of course, Spencer's constant maintenance program also pays off for you when the car of SPENSOL has pulled onto your siding.

You can unload fast with no chance of lost time or lost material, because every fitting works as perfectly as when it was installed!

Careful maintenance that makes for dependable service is one of the many reasons why so many mixers are switching to Spencer Nitrogen Solutions. But dependable delivery isn't the only way Spencer is working to serve mixers.

More Than Just Stay-At-Home Service

Through constant work with farmers, Spencer agronomists are promoting better farming methods, encouraging soil tests and advising farmers to use recommended rates of mixed fertilizer. What's more, Spencer is hard at work trying to help you solve manufacturing problems:

Spencer recently began a program to help manufacturers find ways of producing higher-analysis mixed fertilizer with low-cost raw materials. Problems like these are now under study at a specially constructed mixed fertilizer demonstration unit near Pittsburg, Kansas.

Of course, for many years, Spencer's Technical Service Team has been available to help mixers trace down the cause of trouble in their plant operations.

So next time you get ready to place an order for nitrogen solutions, consider how much more you get when Spencer is your supplier.

Next time, switch to SPENSOL, and see for yourself!

Mr. N SPENCER®

America's Growing Name in Chemicals

Insist on SPENSOL (Spencer Nitrogen Solutions)

SPENCER CHEMICAL COMPANY, Dwight Bldg., Kansas City 5, Mo. District Sales Offices: Atlanta, Ga.; Chicago, Ill.; Memphis, Tenn.; Kansas City, Mo.; Works: Pittsburg, Kans.; Chicago, Ill.; Henderson, Ky.; Vicksburg, Miss.; Orange, Tex.

Speedy SPENSOL Shipment:

1 When a check against the control sheet shows a car needs maintenance, it is taken to the repair shop. During the drying of this car, Elmer Palmer and Jack Smith discuss work to be done.

2 After the worn equipment has been replaced, the paint job is checked. If a "face lifting" is needed, the old paint is removed and a new coat is sprayed on as shown above.

3 Now, looking and working like new, this 8,000-gallon SPENSOL car is ready to be loaded — a process that takes only an average of forty-five minutes, thanks to Spencer's efficient methods.

4 Heading your way, these cars of SPENSOL leave in perfect condition — your assurance of delivery of a full load that will be on time on your siding, and ready to unload *fast*.

Promoting Garden Chemicals

E. I. du Pont de Nemours & Co., Wilmington, Del., has announced a program to help garden chemicals dealers advise customers on purchases of insecticides, fungicides, and herbicides.

A recent du Pont market survey indicated that over half the customer decisions to buy one of their products resulted from the advice of the sales person in the store rather than from any other kind of motivation. Realizing that it is almost hopeless to expect stores to provide sales people with enough technical knowledge so that they can advise customers adequately, du Pont has initiated a program to present technical information directly to the consumer. The information is contained in an eight page, four-color garden clinic guide —a hand-book of pest control prescriptions—which will be run as an insert in a garden magazine whose readers are home owners with gardens.

An additional quantity of booklets will be made available to dealers for distribution to their customers. Scheduled to appear in April, the guide is expected to go to almost one million home gardeners.

Du Pont is aiming for the gardener who recognizes that he needs some technical information and is offering it to him in a form that will be easy to absorb and easy to refer to later. For all major insects, plant diseases, and weeds, it says: "If you have this bug on a particular plant, use this material." Pictures of the pests make identification relatively easy.

•

Wood Joins Conn. Station

A British scientist, Ronald K. S. Wood, has joined the staff of The Connecticut Agricultural Experiment Station, New Haven, for one year to conduct research on plant diseases.

Dr. Wood will study Verticillium diseases and soft rots, important plant diseases in Connecticut. His investigations continue research on the physiology of these pathogens at the Station over a period of many years. He is working with A. E. Diamond, head of the Department of Plant Pathology and Botany.

Davis

Walters

Jefferson I. Davis Jr., former vice president and general manager of the Southeastern Liquid Fertilizer Co., Atlanta, Ga., was elected president of the firm recently by the board of directors. At the same time, A. H. Walters, former sales manager, was named as the new vice president in charge of sales.

Mr. Davis has been with SELFCO since its founding in 1949. Mr. Walters joined the company in 1950 as plant manager at Albany, Ga.

•

Cyanamid Opens Exhibit

The American Cyanamid Co., New York, has opened an exhibit at Rockefeller Center in New York to mark the 50th anniversary of the company's founding and show the role chemistry plays in helping the U.S. make better use of its resources.

The exhibit shows how farmers are using chemicals for soil improvement, crop defoliation, weed killing, insect and rodent control, and for improving and protecting animal health. Many of the displays are designed to allow audience participation. Through the use of special telephone circuits, visitors can start animated displays and then listen to sound track commentaries that accompany motion pictures and slide films.

•

Phosdrin Gets Label O.K.

Tolerances for Shell Chemical Corp.'s Phosdrin insecticide have been established by the Food & Drug Administration, and labels for the product have been accepted by the United States Department of Agriculture, the firm announced last month.

Phosdrin, an organic phosphate developed by Shell, quickly kills insects, then rapidly decomposes into harmless compounds. As a result, longer-lasting insecticides such as endrin can be used up to their recommended period before harvest; then, Phosdrin insecticide can be used up to the day before harvest. This assures growers of maximum full-season protection for their crops, according to Shell.

NPFI Provides Fellowship

California State Polytechnic College, San Luis Obispo, Calif., and the National Plant Food Institute of Washington, D. C., have announced a jointly supported project for the preparation of teaching aids for effective instruction in the area of plant foods, fertilizer usage and crop production.

"Eighty-five per cent of California's farm income comes from crop production," Dr. Julian A. McPhee, president of California State Polytechnic College, said. "We are anxious to provide vocational agriculture teachers with the most effective means of instruction, since fertilizer usage is an important factor in an efficient crop production. We believe particular attention should be given to teaching high school students how to use fertilizer properly."

A $1,500 grant by the National Plant Food Institute will provide a fellowship for an advanced student who will be assigned to this project. NPFI will also contribute toward the production costs of the teaching aids to be developed.

•

Takes Over Vitro Sales

Berkshire Chemicals, Inc., of New York has taken over all the sales activities of Vitro Manufacturing Co., Pittsburgh, Pa., one of the world's leading ceramic color producers.

Berkshire, a wholly-owned subsidiary of Vitro Corporation of America, New York, will maintain the same sales staff which has served Vitro Manufacturing, a Vitro division.

Two new Berkshire sales offices, established for the distribution of Vitro Manufacturing products, are located in Pittsburgh, Pa., and Compton, Calif.

•

Frontier Names Three

Three sales staff appointments have been made by the Frontier Chemical Co., Wichita, Kansas, recently. Richard H. Barton has been named product manager for insecticide chemicals. Bill G. Quick was appointed product manager of Frontier's

Problem:

Slippery bags that let profits slip away

Ordinary smooth-surfaced multiwall paper bags often slip and break during handling. This means costly repacking. And since slippery bags can't be stacked in high piles, they waste valuable floor space in storage.

Fulton's Solution:

Coated bags that resist slipping

Multiwall paper bags coated with Fulton's invisible Ful-Grip® will resist sliding at a 15% steeper angle of tilt than ordinary uncoated bags. They handle better . . . stack higher to save floor space . . . permit larger pallet loads . . . yet cost only a fraction more than regular bags.

For your packaging or protection problem . . .
Let our Special Services Division show how Fulton products can answer your requirements. We manufacture a complete line of multiwall paper and textile bags, industrial fabrics and made-up textile items. Write: 1416 Annunciation Street, New Orleans, La.

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BAG & COTTON MILLS

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NEW ORLEANS • NEW YORK • OKLAHOMA CITY • PHOENIX • ST. LOUIS • SAVANNAH

salt division at the Odessa, Texas, sales office; and Bob Redmond was named sales control manager in Frontier's Wichita offices.

•

3 Grant Aids to K-State

Protection of stored products and their users will be studied under three research grants going to the department of entomology at Kansas State College, Manhattan, Kans. Nearly $30,000 has been appropriated for these studies during the current year.

The largest grant, $12,420, is from the U. S. Public Health Service for a program of research into environmental influences on insects in stored products. D. A. Wilbur is in charge of the investigations.

The Frontier Chemical Co., Wichita, has provided a grant of $10,000 to support studies of the significance of toxicant absorption in relation to the effectiveness of grain fumigants. C. C. Roan, Lallan Rai, and Mr. Wilbur are co-workers in this research.

Factors affecting toxicity of certain fumigants for stored grain insect control will be examined in a program sponsored by the Diamond Alkali Co., Cleveland. Working on the study will be Mr. Wilbur, whose specialty is stored grain insects, and Philip K. Harein.

•

OK American Ag. Expansion

The Zoning Board of Appeals of Buffalo, N. Y., has approved plans for an expansion and modernization program by the American Agricultural Chemical Co. at its plant there.

Approval was granted after neighbors withdrew their objections upon receiving assurances that the plant would install equipment to eliminate dust and acid fumes.

•

Monsanto Building In Ark.

A new fertilizer plant which will produce a maximum of 100 tons of urea daily will be constructed at the old Lion Oil Co. Chemical plant in El Dorado, Ark., by the Monsanto Chemical Co., St. Louis, Mo.

The new plant is expected to be in operation by the fall of 1958.

Velsicol Names Utermohlen

Dr. William P. Utermohlen Jr., has been appointed Director of Research of the Velsicol Chemical Corp., Chicago.

Since 1940, Dr. Utermohlen has been engaged in research work for the Tennessee Eastman Co., the Institute of Textile Technology, and the Permutit Co., whom he served as Chief Research Chemist. Prior to joining Velsicol, Dr. Utermohlen was Assistant Research Director of the Toni Division of the Gillette Company.

At Velsicol, Dr. Utermohlen will be responsible for all fundamental and applied research in agricultural chemicals, polymers, organic processes, resin applications and other fields of new interest. Dr. Utermohlen will be located at Velsicol's main office and laboratories in Chicago.

•

Westvaco Names Oskin V.P.

The Westvaco Mineral Products Division of Food Machinery and Chemical Corp., New York, has named Donald C. Oskin vice president and assistant division manager in charge of marketing. Mr. Oskin has also been appointed permanent chairman of the Westvaco Mineral Products Division Development Committee. He has been succeeded as division sales manager by James R. Harris.

Mr. Oskin joined Westvaco's sales department in 1945. He was appointed director of district office sales in New York in 1952 and in 1954 he became manager of sales for the Division.

Mr. Harris has been a member of the Westvaco Mineral Products Division's sales department since 1949. In 1954 he was named assistant manager of sales for the Division, a post he held until his present appointment.

•

Miller Chemical Names 3

Miller Chemical & Fertilizer Corp., Baltimore, Md., has announced the appointment of Frank R. McFarland as technical sales director, and Lou F. Fries as sales manager of the Home Garden Division; and Ross E. Holtz as sales manager of the Export Division.

Mr. FcFarland has been with Miller since 1954 as agriculturist and assistant sales manager. Mr. Fries was formerly a sales representative, and Mr. Holtz has been with the company for five years as sales representative and office manager.

•

To Study Plant Food Demand

A research project to develop methods for estimating regional and national demand for plant food, one and two years in the future, has been established by the National Plant Food Institute, Washington, D. C., and will be conducted by the North Carolina Agricultural Experiment Station under a grant from the Institute.

Members of the Institute staff met with Dr. R. A. King, project leader for the study, and Wilson Riggan, research assistant, for the purpose of reviewing plans and establishing benchmarks.

Dr. King hopes to be able to evaluate all of the various factors which influence trends in fertilizer consumption, and to develop a formula which will make possible at least short-term projections of demand. The study will consist of an examination of previous work in this field, an evaluation of available data, and an attempt to construct appropriate models on the basis of this information for estimating future fertilizer consumption trends.

•

Fitzgerald Joins Baker

Clarence Fitzgerald has joined the Atlanta, Ga., sales staff of H. J. Baker & Bro.

He will represent the company in all areas of its activity—heavy chemicals, fertilizer materials, pharmaceuticals, greases, oils, fats, meals, and animal feeds.

Before joining Baker, Mr. Fitzgerald had been with the brokerage firm of Theo. W. Martin & Son, Atlanta.

•

Stelzer Joins Calspray

Dr. Lorin R. Stelzer has joined the California Spray-Chemical Corp., Richmond, Calif., as a research entomologist.. Dr. Stelzer will devote his entire time to the improvement and expansion of Calspray's Ortho line of garden and home products.

QUIZ
For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"

1 Is your bag correctly sized for your product?
2 Is your bag properly constructed for your product?
3 If loss of product is caused by deterioration, would special protective sheets help to reduce such loss?
4 Is the total cost of your bag out of proportion to the selling price of your product?
5 Does your product cost warrant redesigning your bag to merchandise your product more effectively?
6 Are you using the most economical filling machine available for packaging?
7 Are your current suppliers giving you the service you desire?
8 Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?
9 Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

KRAFT BAG CORPORATION

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Plants at St. Marys, Ga. and Gilman, Vt.

Sales Agents for The **Kraftpacker** Open Mouth Bag Filling Machine

Gilman PAPER CO.
- St. Marys Kraft Corp.
- Gummed Tape Div.
- The Gilmored Corp.
- Kraft Bag Corp.

☐ O.K. Kraft...Help me to answer your Quiz. Please have representative call. AC —

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

PRODUCT MFD._____

NAME_____

Spray Operators' School

The 10th Illinois Spray Operators' School will be held on Jan. 23 and 24, 1958, at the University of Illinois, Urbana.

Subjects to be covered will include insect and weed control on field crops and equipment and application of liquid fertilizers. All sessons will be held in the Illini Union building.

•

NPFI Sponsors Two Projects

The National Plant Food Institute is sponsoring study projects at the University of Kentucky, Lexington, and the University of California, Davis.

The Institute has given $6,000 to the U. of Kentucky Agricultural Experiment Station for a chemical plant-food study project under the direction of E. C. Doll.

Three annual grants of $3,000 each will support a study of the basic principles involved in the interrelationships of soil, moisture, and fertilizer at the U. of California. The studies will be cooperatively supervised by Daniel G. Aldrich Jr. and Robert M. Hagan.

•

Myrick Heads New Department

O. D. Myrick, Jr., has been appointed director of the newly organized Development Planning Department of the Davison Chemical Company Division of W. R. Grace & Co., Baltimore.

The company has organized the department to assist in the expansion efforts of Davison's products divisions. Mr. Myrick has been with Davison since 1942.

•

Named Research Director

Dr. Ernest P. Imle has been named Director of Research of the American Cocoa Research Institute to succeed L. Paul Oechsli, who resigned to take a position with the International Cooperation Administration in Chile.

Dr. Imle was with the United States Department of Agriculture for fifteen years, first as plant pathologist on their natural rubber program and later as Director of the U. S. D. A. Regional Rubber Research Station at Turrialba, Costa Rica. He has also served on the staff of the Boyce Thompson Institute for Plant Research at Yonkers, New York, as a research pathologist working on greenhouse and nursery crops.

•

Burden Named To Head WACA

Ivor R. Burden, Executive Vice President of United-Heckathorn, Richmond, California recently was elected President of the Western Agricultural Chemical Association. Thomas S. Castle of A. L. Castle Company was elected Vice President and Charles O. Barnard was re-elected Executive Secretary.

•

Monsanto Expands Agr. Lab.

Construction has begun in St. Louis, Mo., on new, expanded laboratory and greenhouse facilities for agricultural chemicals research by Monsanto Chemical Company's Organic Chemicals Division.

The new research unit is being constructed adjacent to the new corporate general offices occupied by Monsanto last month.

Scheduled for occupancy in mid-1958, the new facilities will include a modern two-story building housing offices, conference rooms, laboratories and library. Adjoining it will be eight greenhouses and one-story material receiving and storing accommodations.

•

V-C Shifts Two

The Virginia-Carolina Chemical Corp., Richmond, Va., recently announced that John M. Daniel Jr. has been named to head the fertilizer process and mechanical development department of the company's fertilizer division.

Philip E. Stone, former group leader in the research and development department, was named technical assistant to the general manager of the fertilizer division at the same time.

•

SW ESA Meeting at Houston

The annual meeting of the Southwestern Branch, Entomological Society of America, will be held at the Shamrock Hilton Hotel in Houston, Texas, Feb. 10 and 11, 1958.

Stauffer Grants Rights

The Stauffer Chemical Co., New Cork, has granted foreign manufacture and sales rights on Vapam soil fumigant to the Rohm & Haas Co., Philadelphia.

The license covers all foreign countries except U.S. possessions, Belgium, Luxembourg, and the Netherlands.

•

Summers Transfers Totman

James C. Totman has been transferred from Summers Fertilizer Company's Bangor office to the company's home office, Totman Building, Baltimore, Md., where he has assumed new duties as assistant to the president.

For the past ten years, he has been actively associated with both Summers as assistant treasurer and manager of the Bangor office and with Northern Chemical Industries, a Summers' affiliate, as vice president.

•

FFA Names Riemer Chairman

Hugo Riemer, president of Nitrogen Division, Allied Chemical & Dye Corp., New York, has been elected chairman of the Sponsoring Committee of the Future Farmers of America Foundation. His election took place at the annual convention of the Future Farmers of America, held in Kansas City, October 14-17.

Mr. Riemer, who will take office January 1 for a one-year term, will direct fund raising activities for the Foundation's awards program.

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Pennsalt To Build In B.C.

The Pennsalt Chemicals Corp., Philadelphia, has taken an option on a plant site in western British Columbia.

•

To Build Distribution Units

Chas. Pfizer & Co., Brooklyn, will build two distribution centers at Clifton, N.J., and near Atlanta, Ga.

The Eastern distribution center in Clifton will house Eastern headquarters for Pfizer's chemical sales, agricultural sales, and the J. B. Roerig & Co. division. The Southeastern center will be in Chamblee, Ga., a suburb of Atlanta.

Pesticide Application Problems Discussed at 9th Spray Conference in Spokane

IT may become necessary in the State of Washington to adopt a flat prohibition against possession or use of high volatile 2,4-D. More complaints arise over use of 2,4-D than from all other sources combined, Henry Seidel, assistant director of the Washington State Department of Agriculture, declared in a talk delivered at the 9th annual Dusting and Spraying Conference. The conference, sponsored jointly by the Washington State Aeronautics Commission and Washington State College Institute of Agricultural Sciences, was held in Spokane, Washington, October 29. Approximately 150 were in attendance.

Legal obligations of aerial and ground spray applicators, and of pesticide manufacturers, came in for extensive attention on the conference program along with discussion of precautionary measures to minimize the hazards in pesticide application. In one report it was pointed out that a pesticide manufacturer escaped damages in a law suit brought by a Washington farmer because advertising clearly indicated the material applied was experimental, and the farmer failed to follow directions on the label. This was brought out by J. P. Felix, attorney and executive secretary of the Washington Association of Ground Sprayers. In his talk on "Civil Suits Resulting from Custom Application of Chemicals," he emphasized the importance of keeping "good and sufficient" records of temperature, humidity, wind velocity and direction, kind and amount of chemicals being applied, etc.

Such records often prove vital in the event suit is brought against the pesticide applicator, he pointed out. If there is indication a damage claim may be filed, an immediate and extensive investigation should be made. Autopsies in cases of fatalities have often cleared pesticides of blame it was declared in discussion at the meeting. If expense is a barrier, the pilot's association will pay for such autopsies, officers of the organization said.

"It behooves you to follow the rules and regulations in regard to flying and spraying," Mr. Felix declared in outlining what pesticide applicators can do to lessen the chances of successful damage suits against them. "As an expert you are held to a higher degree of accountability" in applying pesticides," the speaker continued. "If you are following the farmer's directions and things don't go right with his crop, he has no grounds for action against you, but his neighbor may. If you make the recommendations, however, and damage results, then you may be liable to both. If your actions cause damage to a neighbor, both you and the farmer may be liable."

Insurance is the best protection, the speaker recommended, but it's a very complicated contract, so it is the wise pilot who goes to his own attorney and has the latter examine several different policies. "Be an expert," he urged. Apply the chemicals by "normal, usual, and accepted methods." These things will help lessen the chances of a successful damage action being brought.

Minimizing Poisoning Hazards

PRECAUTIONS against organic phosphorus poisoning have been somewhat mis-directed, Dr. G. E. Quinby of the U. S. Public Health Service toxicology laboratory at Wenatchee, Wash., pointed out. There is much more danger of poisoning through the skin than through the nose. Pilots in particular should devote 95% of their self-protecting efforts to keeping organic phosphates off their skin, and 5% to the respiratory route. Some masks worn by pilots for protection when applying organic phosphates add dangerously to the hazard of flying by interference with vision, he declared.

Pilots splashed with highly toxic pesticides in crash landings should forget about their planes and their modesty and endeavor to save their lives by getting out of their clothes and into water as fast as they can. Several have died as the result of failure to do this, Dr. Quinby observed.

Pilots should never personally load their planes because the loader is the one who normally receives the

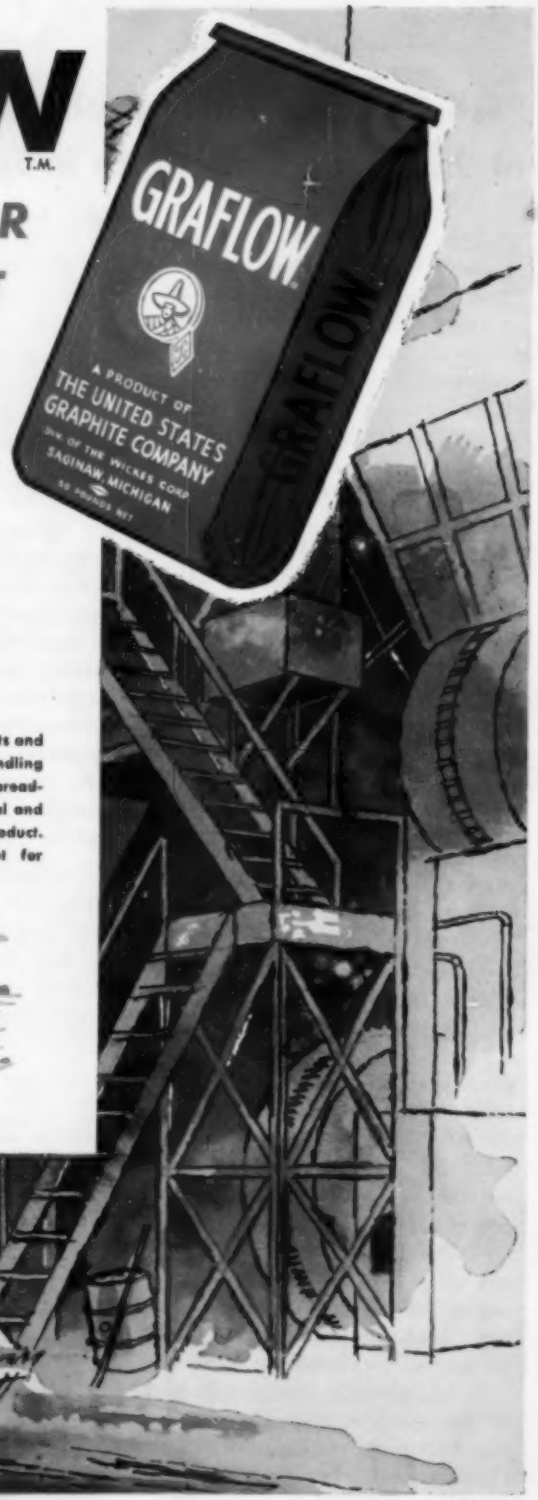
In charge of program at 9th annual Aerial Dusting and Spraying Conference, sponsored jointly by Washington State Aeronautics Commission and Washington State College Institute of Agricultural Sciences, were (left to right): Dr. Thomas J. Muzik, associate agronomist, and Dr. H. S. Telford, chairman of the department of entomology, Washington State College, and Robert L. Nuber, director of Washington State Aeronautics Commission. Conference was held October 29 in Spokane.

GRAFLOW T.M.

REDUCES WEAR IN YOUR MIXING EQUIPMENT

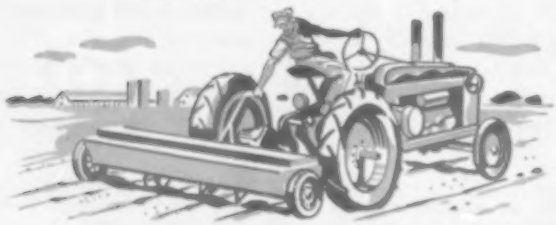
WHEN ADDED TO YOUR FERTILIZER

GRAFLOW is a conditioning agent for fertilizer that is paying for itself many times over in efficiently operated fertilizer plants. Added, as an ingredient, in either pulverized or granular form, GRAFLOW substantially reduces corrosion of the equipment in the mixing cycle. GRAFLOW reduces caking, and it increases flowability of your product.



THERE'S NEW SALES APPEAL IN A GRAFLOW TREATED PRODUCT

GRAFLOW is basically one of nature's finest lubricants and coating agents. Because it so greatly improves handling and reduces wear and corrosion in farm-fertilizer-spreading-equipment, GRAFLOW can provide an additional and effective sales and advertising advantage to your product. Write to our Chemical Development Department for complete information.



GA 241-1

THE UNITED STATES GRAPHITE COMPANY

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GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

greatest exposure. Self-administration of atropine was also condemned. Several deaths have occurred, the speaker indicated, as a result of masking phosphorus poisoning symptoms by persons who had taken atropine without first consulting a physician. "Some pilots have been eating atropine pills like popcorn," he declared. "There actually have been cases of atropine poisoning among men who had a very low phosphorus exposure."

Permanent damage to humans is more likely to occur through prolonged exposure to the higher-powered forms of the chlorinated hydrocarbons than through the less toxic types of organic phosphates that have been introduced, Dr. Quinby suggested. Although chlorinated hydrocarbons are broken down in the human body into less harmful products and are excreted, only the exposure will determine whether the poisons are excreted more rapidly than they are absorbed into the system.

Weather conditions in the Pacfic Northwest this past season were particularly favorable for pear psylla, so the pest appeared in abnormal numbers in pear orchards of central Washington, Ervin S. Dailey, survey entomologist for Washington State College, reported. The unusually heavy infestation may also have resulted in part from omission of some sprays ordinarily applied by orchardists in the area.

Pea aphids built up this past season, he reported, into much greater than normal populations in eastern Washington fields, with the result that one of the greatest tonnages of pesticides in the history of the area was applide to control them.

Newer Herbicides Reviewed

MALEIC hydrazide under Washington conditions "has been one of the most consistent chemicals—it never worked," quipped, Dr. T. J. Muzik, Washington State College associate professor of agronomy. In the Mid West and East where humidity is high, the chemical has been effective, but it has not worked in Washington where the humidity is low. "Simazin," a new Geigy herbicide, is still experimental in weed control, he went on. Preliminary studies indicate toxicity toward many broadleaf and grassy weeds, but because corn appears to be especially resistant to it, Simazin has worked well in weeding cornfields chemically.

Sesoxane (2,4-DS) is non-phytotoxic, but is converted in the soil into a material which kills plants readily. Because of this characteristic it has been found promising in killing germinating weed seeds in corn, gladiolus, and nursery plantings. It is relatively harmless to strawberry foliage, so it has been used in fields where this fruit is produced.

EPTC (ethyl N.N-di-n-propylthiocarbamate), available as a stable, non- corrosive, emulsifiable concentrate, is still experimental in Washington where results as yet have not been too promising.

This lack of effectiveness in weed control could, however, be due to improper timing in tests made, he added.

Diesel oil or fertilizer added to 2,4-D makes a better weedicide in wheat than does the chemical with water alone. This was the observation of Bob Blacklaw of Eureka, Wash., president of the Washington Flying Farmers, who spoke on "The Airplane at Work for the Farmer."

"After spraying, what happens?" asked Dr. Charles Robocher, USDA research agronomist. stationed at Washington State College in Pullman, and working on control of range weeds. Plants resistant to the herbicide will grow rapidly since they benefit from reduced competition. Many weeds are resistant to chemicals generally used, and others are showing tendencies toward resistance.

He presented two tables showing weeds which can and cannot be controlled effectively by aerial application of herbicides. In the first table he listed 11 weeds controlled by application of from 1 to 3 pounds of 2,4-D or similar materials in solutions ranging from 3 to 10 gallons per acre. In the second were 24 weeds which can not be checked economically by aerial spraying.

Halogeton is a good representative of the weed with all the undesirable characteristics, he declared. Its distribution is erratic, so spraying to control it alone is not within the realm of ordinary farm economics. Furthermore, there is no herbicide which is thoroughly dependable at a price which permits its use on large acreages. It is showing increasing resistance to 2.4-D.

Auburn Norris of Chem-Air, Seattle, first speaker on a panel "Development in Aerial Equipment and Techniques," told the audience that placing the spray booms between the upper and lower wings helps reduce damage to the plane in a forced landing. If the booms are installed securely, there will be no trouble with leaks, and if the pilot is forced to bring the plane down in wheat or weeds, the boom is up out of the way, so cannot turn the ship over.

Use of a plastic tank instead of a metal one for pesticides has simplified and speeded up change-overs from sprays to dusts on his planes, Paul Mitchell of the Bellingham Flying Service, Bellingham, Wash., reported. Formerly it took two men several hours to change the metal tanks, so often it was necessary to turn down a small job if the farmer wanted a different type material from what the flying service was set up for at the moment. Now an experienced man can make the change in 15 minutes.

"If you think you have the best of weeds, you are assuming something which is not true," Larry Semler, chief of the weed branch of the Washington State Department of Agriculture, stationed at Yakima, declared. As a forecast for 1958, he predicted that solutions of herbicides would have to be stronger to control unwanted vegetation. On the other hand, he added, some lack of success during the past season could have been due to unfavorable weather conditions.

No harmful insect pest has as yet built up resistance to an insecticide made from plants, Dr. H. S. Telford, chairman of the department of entomology at Washington State College, and one of those active in promoting the meeting, commented in his talk on "New Developments

(*Turn to Page* 108)

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Vegetable Research Award

The Campbell Soup Co., Camden, N. J., and the American Association for the Advancement of Science jointly announced a new and important award in vegetable research recently. The award will be administered by the AAAS and given for the first time this year. The recipient will receive $1,500 in cash and a bronze medal.

The objective of the new award, which will be known as the AAAS—Campbell Award for Vegetable Research, is to stimulate major scientific contributions of fundamental or practical importance connected with the production of vegetable crops for processing purposes.

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Mathieson Profit Down

The Olin Mathieson Chemical Corp., New York, has announced that net operating profit for the third quarter of 1957 amounted to $9,079,445 and was equal to 67 cents per share. This compares with net operating profit of 74 cents per share in the 1956 quarter.

Sales, however, were up two per cent during the period. The company reported that sales of plant foods and phosphate chemicals improved this September as compared with a year ago.

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Northwest Conf. Jan. 22

The 1958 Northwest Agricultural Chemicals Industry conference will be held in the Hotel Benson, Portland, Ore., on Jan. 22 and 23.

An open meeting with the Northwest Vegetable Insect Conference and the Western Cooperative Spray Project will be held on the 22nd. The conference is sponsored by the Western Agricultural Chemicals Assn. The chairman for 1958 is George W. Coffman of Diamond Black Leaf Products.

•

Heads Northwest Nitro

Howard J. Sanders has been appointed president of Northwest Nitro-Chemicals, Ltd., Canadian agricultural chemicals affiliate of the Commercial Solvents Corp., New York.

Mr. Sanders will continue as vice president and treasurer of Commercial Solvents, which he joined in 1933.

ESA Meeting At Memphis Features Reports On Acaricides And Miticides

NEW pesticide developments, and reports on investigations and field tests of the past year interested entomologists attending sessions of the fifth annual convention of the Entomological Society of America, December 2-5, at the Hotel Peabody, Memphis, Tenn. Meeting jointly with the national association was the Cotton States Branch of the ESA.

Among new products described at the meeting were the acaricide Tedion, and the acaricide-insecticide Niagara 1240. W. C. Ferguson reported on Tedion, 2,4,5-tetrachlorodiphenylsulfone, stating that field tests showed the product to be effective as a larvicide-ovicide in the control of mite species on citrus, deciduous fruits and ornamentals. B. C. Dickinson, reporting on Niagara 1240, bis(S-diethoxyphosphinothioylmercapto) methane, indicated this material has been effective against the tetranychid mites, particularly the European red mite and two-spotted mite.

Pest Control on Corn

STUDIES of Thiodan residues on corn were reported by D. A. Lindquist, M. L. Fairchild, T. A. Brindley, and P. A. Dahm. Thiodan was applied to field corn as a water emulsion and as a 5 per cent granulated formulation at rates of 1.5 and 1.0 pounds per acre.

Results of sprays or dusts applied to soil to control cornstalk borer on sorghum reported by G. L. Bender, and G. L. Richardson listed the following materials for control in the order of their decreasing effectiveness: dusts—R-,303, endrin, dieldrin, chlordane, malathion; sprays — endrin, lindane, dieldrin, heptachlor, aldrin, toxaphene, chlordane. Results of two years experiments were presented.

An evaluation of granulated insecticides for lesser cornstalk borer control by P. D. Gerhardt indicated that the granulated insecticides applied at planting time offered some protection. Formulations of the following, at rates of ¼, ½, and 1 pound per acre were applied at seeding time: 2½% heptachlor, 5% chlordane, 2% dieldrin, 2% aldrin, 2% endrin, 5% Sevin, 2½% di-Syston, 8% compound 12008. Of the chlorinated hydrocarbons, heptachlor, aldrin, and endrin were more effective at all dosages. The systemics, thimet, di-syston, and compound 12008 were less effective, but did not cause phytotoxicity.

Experiments on bulk density of granulated carriers in relation to European Corn Borer Control were reported by J. A. Harding and M. L. Fairchild, who observed there is a trend toward comparable control with either smaller poundages having more particles per acre or larger poundages with fewer particles per acre. Low poundages, they said, having many particles per acre tended to give poorer control than intermediate or high poundages.

V. M. Kirk, reviewing a preplanting treatment for billbug control on corn, stated that a 2-year program conducted to corroborate previously reported data showed that a broadcast, disked-in, pre-planting application of aldrin resulted in excellent control of billbugs on corn. In 1957, two pounds aldrin per acre on mineral soils and 4 pounds on organic soils resulted in reduction of damage from 1% to 1/10%, while untreated fields averaged 56.6% loss of stand.

Messrs. William H. Long, E. J. Concienne, and L. D. Newsom, reviewed results from two years of work with airplane application of insecticides for the control of sugarcane borer. They compared endrin and toxaphene in dust and granulated formulations with the currently recommended and widely used 40 per cent ryania dust and with an experimental 100 per cent ryania dust.

Cotton Pests and Their Control

BEHAVIOR studies on cotton boll weevil in relation to insecticides were reviewed by Robert C. Hunter, who noted that boll weevil activity is stimulated by the onset of daylight, and that activity within the daylight period is affected by temperature and humidity. Observations on habits, he advised, indicate that the boll weevil secures a lethal dose of stomach poison by nibbling on pubescence of stem and leaf surfaces, feeding on stem and leaf surfaces, and by accidental contact of the proboscis with stem and leaf surfaces when walking.

R. E. Furr and E. P. Lloyd, observed that in residual toxicity studies against adult weevils, guthion .5 lb/A, was highly effective; methyl parathion at .5 lb/A was effective for six hours; and malathion tried at 2 lb/A was effective for 24 hours even when caged 24 hours after treatment.

Field tests with several insecticides against cotton insects at Stoneville, Miss., were reported by T. R. Pfrimmer, E. P. Lloyd, and M. E. Merkl. Materials investigated included Sevin, Korlan, Monsanto CP-7769, thiodan, phosdrin, and Hercules 3895.

The 1957 season, observed A. C. Dowdy, was the third consecutive season during which "All-Purpose" fruit sprays were evaluated on a grower-trial basis in Michigan. Some 15 commercial formulations, 8 experimental insecticide-fungicide combinations and 10 different types of application equipment underwent trial. Most outstanding chemicals tested to date, according to Mr. Dowdy, include insecticides, Sevin, malathion, and methoxychlor; and fungicides, Cyprex, captan, ferbam, and glyodin.

Field studies in control of orchard mites were reported by M. L. Cleveland, where the following miticides were tested: 100 viscosity oil, Tedion, Genite, Chlorbenside, demeton, Thimet, ovex, Dow M-928, Chipman R-6199, schraden, and Fensone as early season miticides; Trition, Aramite, Thimet, demeton, Tuthion,

chlorobenilate, ovex, Chipman R-6199, Dow M-928, Kelthane, Niagara 1240, and Delnav (Hercules 528) as summer miticides. All early season miticides, except the dormant oil schedule were effective in controlling European red mite for at least 60 days after petal fall. None of the materials tested exhibited any phytotoxic effect on the fruit or foliage.

Regulatory Entomology

SEVERAL quarantine and regulatory programs were reviewed at the annual meeting of entomologists. L. J. Padget discussing the Khapra Beetle infestation indicated that the U.S.D.A. eradication program conducted in cooperation with the states concerned, and with the Department of Agriculture of Mexico is apparently drawing to a successful close. He outlined the methods used to accomplish this end. W. V. O'Dell observed that the problem of controlling the gypsy moth in the northeast, and preventing its spread to other sections of the country was aggravated by a serious and unprecedented outbreak of the pest in 1953. He reported on the 1956 and 1957 activities to curtail the infestation, and eliminate peripheral infestations. Parasites and other natural control factors contributed to low incidence of defoliation in 1957 throughout the generally infested area of New England and eastern N. Y.

A State-Federal program is being conducted to locate and delimit infestations of the Mediterranean Fruit Fly, reported G. G. Rohwer. The second invasion in the U. S. of this insect was found at Miami in April, 1956. The previous infestation of 1929-30 was successfully eradicated, principally through host destruction. The current program will rely heavily on insecticides.

H. B. Green and R. E. Hutchins, gave a progress report on imported fire ant studies in Mississippi. They stated that food and bait studies indicate this ant to depend largely on other insects for food. Attractant additives for bait show promise in control measures. Tests underway are designed to compare methods of application and response to various materials. Investigated are: applications of ½, 1 and 2 pounds of dieldrin per acre; 1 pound of dieldrin applied as spray, granulated and fertilizer mixture; 2 pounds dieldrin granules; 1 pound heptachlor spray, granules, and fertilizer mixture; 1 pound aldrin, granules; 1 pound thiodan and 10 pounds toxaphene spray and granules.★★

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Israeli Visits Collier

A Government of Israel agricultural specialist last month visited the Collier Carbon & Chemical Corp., Los Angeles, for the purpose of studying the different uses of liquid fertilizers in the United States.

Aron Beresky, agronomist for Fertilizer and Chemicals Ltd., Haifa, Irsael, discussed advantages of aqueous ammonia fertilizer with R. L. Luckhardt, Collier agronomist.

For the last two years the Israelis have been conducting a series of field tests with liquid fertilizers (anhydrous ammonia, aqueous ammonia ammonium nitrate solution) and dry ammonium sulphate.

TOP: This 8'-0 x 60'-0 rotary dryer removes excess moisture and completes the granulation. Dryer is oil heated.

RIGHT: The lifters, with their unique cup-like design and their staggered arrangement in the unit, cause the granules to be evenly distributed.

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Eastern Branch ESA Discusses Gypsy Moth Spray Program

NOV. 26—An "Appraisal of the Gypsy Moth and other Mass Insect Control Programs" highlighted the program at the annual meeting of the Eastern Branch, ESA, November 25-26, Hotel Commodore, New York City. Charles E. Palm, Cornell University, moderated the panel considering the gypsy moth program, while panel members reported on the objectives, accomplishments and effect on fish and wildlife. Participating were: E. D. Burgess, USDA, Neely Turner, Connecticut Agricultural Experiment Station, and Paul F. Springer, U. S. Department of Interior.

It was pointed out that it is impossible to keep foreign pests out of restricted areas, in spite of quarantine measures . . . that quarantines are not enough for success without some control measures for eradication. Mr. Burgess observed that while insect populations are allowed to grow, man-made barriers are futile. The current infestation gives just a small idea of the potential seriousness of the problem, if it is not checked and eradicated, he remarked. Considering the economic importance of the gypsy moth, N. Turner reported estimated annual damage in New England between 1932-52 was about $6½ million. In the same period some $40 million were spent by the states and federal government in control measures. It was also pointed out that the eastern half of Connecticut has not been sprayed since 1939, and that not one acre of that woodland has been defoliated since that date . . . that the present value of heavily infested woodlands in Connecticut is not sufficiently great to justify eradication of the gypsy moth.

Mr. Turner referred to 50 years of an unsuccessful effort to hold the gypsy moth from spreading. DDT has failed to eradicate this pest in the New York area, and repeated sprayings have been necessary in Cape Cod and Nantucket, which still report some gypsy moth infestations. "Uneradicated gypsy moths are not trivial," stated Mr. Turner, "they make eradication impossible. The reservoirs of gypsy moths around New York water reservoirs are as much of a menace to eradication as all the gypsy moths in New England."

The effects of pest control chemicals on fish and wildlife were reported by Paul F. Springer, who stated that in addition to the initial effect of insecticide sprays on fish and wildlife, secondary factors to be considered are the ingestion by wildlife of poisoned insects, the late introduction of residual insecticides into streams and lakes following rainfall, effect on wildlife and their offspring through exposure to sublethal dosages of pesticides, etc. He discussed not only the current gypsy moth program, but the spruce budworm control program and the Mediteranean Fruit Fly control measures. Mr. Springer indicated that air and ground applications of malathion as a control program in southern California had no harmful effect

(Continued on Page 106)

Potash Producers Rescind Action, Rejoin N.P.F.I.

John A. Miller, president of the National Plant Food Institute, Washington, D. C., recently announced that five potash companies have rescinded their action to withdraw from membership in the Institute and the sixth potash producer is recommending retention of membership to the chief executives of the parent corporation.

Potash companies retaining their membership in the Institute are: American Potash and Chemical Corp., Los Angeles; Duval Sulphur & Potash Co., Houston, Tex.; National Potash Co., New York; Potash Company of America, Carlsbad, N. Mex.; and the Southwest Potash Corp., New York.

An official of the sixth company, the United States Potash Company, stated that recommendations are being made to chief executives of the parent corporation to retain membership in the Institute.

The six potash companies tendered their resignations following the 1957 Institute convention when they disagreed on the dues structure approved by the Institute Board of Directors for financing and expanded research and education program.

"We are most happy to again welcome the potash producers to membership in the Institute," Mr. Miller said. "These potash companies and their personnel are essential to the success of all programs of the Institute and now with a united front we can move forward more effectively with the greatly needed expansion of research and educational programs so essential to the future success of the fertilizer industry."

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NYS Insec.-Fung. Conf.

More than 450 representatives of industry, government and the experiment stations met at the annual New York State Insecticide and Fungicide Conference at Bibbins Hall, Cornell University, Ithaca, N. Y., in mid-November. R. Bradfield, of the Cornell agronomy department opened the 2-day meeting with a review on the advances of science. As in previous years, the highlight of the meeting was the presentation of the 1958 recommendations for New York State (these are available from the Entomology Department of Cornell.

Discussions on application equipment and reports on research results of investigations conducted in the course of the year were moderated by the following chairmen: H. H. Schwardt, head of the department of entomology at Cornell University; P. J. Chapman, Orville Friench, and G. Kent, all of the New York State Agricultural Experiment Station.

Guest speakers included Lea S. Hitchner, NAC executive secretary, who reviewed legislation as it affects the pesticide industry; a report on the logarithmic sprayer by G. W. Wensleyl, Fisons Ltd.; and a discussion of machinery development by Dr. Popham, USDA.

Weed Meeting Jan. 13-16

"Fundamental Research in Weed Control" will be the theme of the general session at the second meeting of the Weed Society of America, according to W. B. Ennis, Jr., society president. The society will meet January 13-15, 1958, at the Hotel Peabody, Memphis, Tennessee.

Host to the meeting will be the Southern Weed Conference whose annual meeting will be held on January 16, following the Weed Society of America's meeting.

Leading authorities from three nations will discuss various phases of weed control at the opening sessions of the Society meeting Monday morning, January 13.

Following the Presidential address by Dr. W. B. Ennis, Jr. will be W. E. Loomis, Iowa State College, who will discuss "The Role of Basic Research in Weed Control." Dr. H. L. Haller, Agricultural Research Service, USDA, will speak on "The Impact of the Miller Bill (Public Law 518) on Research and Development of Herbicides and Recommendations for Their Use in Crops."

•

Amer. Ag. Sales Appointees

The American Agricultural Chemical Company announced personnel changes in its chemical control and fertilizer sales departments. Joseph Padar is appointed chief chemist of the chemical control laboratory at Danville, Illinois, serving the Danville and Seymour, Indiana fertilizer plants.

J. W. Grooms, formerly with the Savannah, Georgia fertilizer sales office, is assistant manager of fertilizer sales at Greensboro, North Carolina.

•

Calspray Honors Two

Dr. A. C. Sessions and Dr. J. W. Hansen of the research staff of the California Spray-Chemical Corp., Richmond, Calif., recently were honored for long and outstanding service to the company.

Calspray president A. W. Mohr presented a 25-year service pin to Dr. Sessions and a 15-year pin to Dr. Hansen at a luncheon that was part of the corporation's week-long Western Research meeting at San Rafael, Calif., from Oct. 28 through Nov. 1.

•

Fertilizer Short Course

The Georgia Coastal Plain Experiment Station, the Georgia Plant Food Educational Society, and the Abraham Baldwin Agricultural College, Tifton, Ga., are sponsoring a one-day short course on "Fertilizers and Soils" at the college campus on Dec. 3.

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USDA Registers Dyrene

Dyrene, a new fungicide, has been registered by the U. S. Department of Agriculture for use on potatoes and tomatoes. It is made by Chemagro Corp., New York.

•

Seek Fertilizer Plants in Spain

Three Spanish interests are seeking permission from the Industry Ministry to build two fertilizer plants in Seville. Union Espanola de Explosives and Iberica de Nitrogeno wish to build a $20 million plant for production of 120,000 tons of nitrogenous fertilizer, 30,000 tons of potassium sulfate, 18,000 tons of bicalcic phosphates and 75,000 tons of superphosphates.

Amoniaco Espanol S.A. wishes to build a $9 million factory for production of nitrogenous products using coal or diesel oil instead of electricity.

Amoniaco Espanol estimates that $5 million will be spent on machinery.

•

WACA Spring Meeting

The Spring Meeting of the Western Agricultural Chemicals Assn. will be held at the Hotel Biltmore, Los Angeles, on April 22, 1958.

•

Named General Manager

Frank B. Stewart was named general manager and executive vice president of the Miller Products Co., Portland, Ore., at the recent annual meeting of the board of directors.

Mr. Stewart, who has been with the Miller Company for 11 years, had been acting as assistant general manager and vice president at the time of his appointment.

Nitrogen Production Decreasing

The annual review of the nitrogen industry by Aikman (London) Ltd., states that production of nitrogen in the United States has been reduced owing to uneconomic prices and the impossibility of disposing of surplus capacity. A number of producers, according to the report, who had been working at a loss, were forced to close down.

At the end of this year, it is expected that the capacity of synthetic nitrogen in the United States will be about 3.65 million metric tons, or 3.825 million metric tons if by-product is included, but the total production for the year 1957-58 is unlikely to exceed 2.9 million metric tons in all. Consumption in the United States during the same period is estimated at 2.9 million metric tons, of which .9 million is for industrial and military purposes.

Consumption of nitrogen is still on the increase in the world market, although the percentage has slowed down during the last year.

•

Brown Named Allied V.P.

Chester M. Brown has been elected vice president of the Allied Chemical & Dye Corp., New York. Mr. Brown is president of the company's General Chemical Division.

At the same time, Kerby H. Fisk was elected chairman of the board of Allied Chemical and Carlton Bates and Harry S. Ferguson were named to the newly created positions of executive vice presidents.

'57 Potash Deliveries Up

Deliveries of potash for agricultural purposes in the United States, Canada, Cuba, Puerto Rico, and Hawaii by the eight principal American producers and also the importers totaled 2,576, 304 tons of salts containing an equivalent of 1,520,440 tons K_2O during the first nine months of 1957, according to the American Potash Institute.

This was an increase of over 5% in salts and K_2O over the same period in 1956. Continental United States took 1,426,424 tons K_2O, Canada, 49,516 tons, Cuba, 10,185 tons, Puerto Rico, 14,600 tons, and Hawaii, 19,715 tons K_2O.

Beltwide Cotton Conference

The 1957 Beltwide Cotton Production Conference at Memphis, Tenn., on Dec. 12 and 13 will include talks on cotton disease control, boll weevil research, and weed control, according to the tentative program.

Harlan E. Smith, Texas Agricultural Extension Service, College Station, will speak on What Constitutes a Good Cotton Disease Control Program.

Changes in recommended insecticides for cotton will be discussed by Dr. J. C. Gaines, head of the department of entomology, Texas A. & M. College, College Station.

C. F. Rainwater, In Charge, Cotton Insects Section, Entomology Research Division, USDA, Beltsville, Md., will tell of promising leads from basic research on boll weevils.

Practical application of cultural and mechanical means of controlling insects will be the topic of a paper presented by H. G. Johnson of the National Cotton Council's Production and Marketing division.

J. V. Vernon, President of the Niagara Chemicals Division, Food Machinery and Chemical Corp., Middleport, N. Y., and also president of the National Agricultural Chemicals Association, will discuss preplexing hurdles in developing agricultural chemicals.

Among the weed control topics are: Weed Control in a Wet Year by Dr. Walter K. Porter Jr., plant physiologist Louisiana Agricultural Experiment Station, Baton Rouge; and Looking Ahead at Weed Control by Robert Wilson, cotton producer of Arlington, Tenn.

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New Quarantine Station

A new plant quarantine inspection station has been opened at the New York International Airport at Idlewild for the convenience of business firms and persons authorized to import plants and plant propagating material.

The new station will make it possible for plant imports to be cleared in as little as three hours after arrival from abroad, according to officials of the USDA's Plant Quarantine Division. Previously, incoming plant shipments had to be trucked in bond from Idlewild to the Hoboken (N. J.) plant quarantine inspection house for processing, a procedure which often consumed three days.

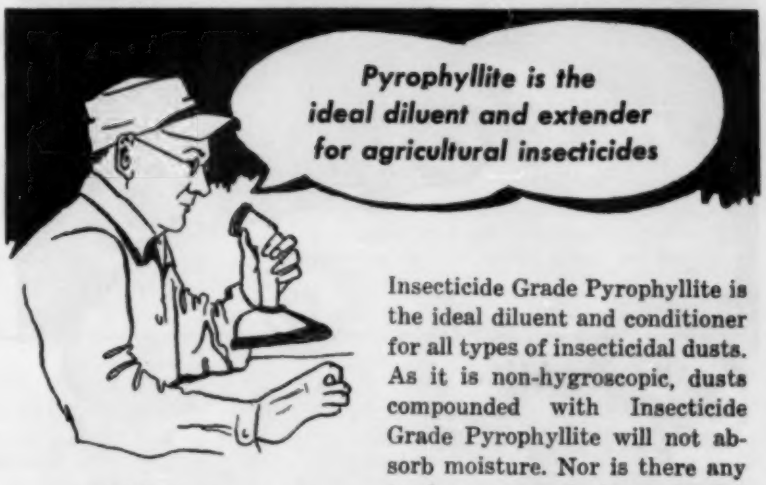
Equipment at the new station includes a 240-cubic-foot chamber for vacuum or atmospheric fumigation with methyl bromide, an autoclave for steam sterilizing soils, and a small tank for applying close tolerance hot water treatments. There is also an electric oven for dry-heat treaments of certain non-living plant materials.

Analysis At Crossroads

The Quality Control Meeting of the National Plant Food Institute, was held at the Shoreham Hotel in Washington, D. C., on Oct. 17.

In an opening address, chairman Dr. Vincent Sauchelli traced the history of chemistry and said that the analytical chemist is at a crossroads today. He must make a decision to lead or follow in the rapidly developing field of electronic science.

New techniques have revolutionized chemical analysis, Dr. Sauchelli pointed out, but generally the attitude



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towards analysis displayed in our industry has not changed apace. He said that several competent leaders have recently criticized industry for requiring too many useless analyses.

In large laboratories, test tubes are being pushed aside in favor of the emission spectrophotometer, nuclear resonance analyzer, differential refractometer, infra-red spectrograph, vapor fractometer, mass spectrophotometer, and flame photometer.

"I know of several laboratories in the fertilizer industry," he continued, "which regularly use the flame photometer to determine potash and the infra-red spectrophotometer to test pesticides. We are headed in the right direction and shall get there, even if the pace of some is snail-like or stagnated."

•

V-C Earnings Up

Earnings of the Virginia-Carolina Chemical Corp., Richmond, Va., in the quarter ended Sept. 30 were $58,488, up from the $12,744 earned in last year's like period.

For full killing power, your dusts and sprays need the right physical properties — to absorb and disperse the toxicant thoroughly — to make them cling, cover, and stick in doing their deadly work. Vanderbilt carriers, diluents, and dispersing agents are *specially developed* to give dusts and sprays these important physical properties that mean more efficient coverage and increased lethal effectiveness in the field.

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Outstanding dispersing agents. Produce increased toxicant effectiveness through better dispersion of wettable concentrates.

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Alabama Plans Pest-O-Rama

Pest-O-Rama, an educational presentation of all phases of pest control, will be presented at the Alabama State Coliseum, Montgomery, on Jan. 20 and 21, 1958.

Sponsored by the Alabama Association for the Control of Economic Pests, the presentation will feature late developments for control of insects, plant diseases, weeds, nematodes, and rodents. To sell the public on the importance of pests and their control, there will be displays and exhibits, authoritative talks, general interest movies, and demonstrations.

Space has been sold to commercial concerns to exhibit their chemicals and application equipment. Educational exhibits also will be prepared by the U. S. Department of Agriculture, the State Department of Agriculture, and the Agricultural Experiment Station and Extension Service of the "Alabama Polytechnic Institute, Auburn.

•

Hercules Ups Capacity

The Hercules Powder Co., Wilmington, Del., announced recently that it will double its capacity for the production of urea at its Hercules, California plant.

Hercules had originally planned to construct a 10,000 ton-a-year facility but have increased the planned capacity to 20,000.

Using the Swiss Inventa process, Hercules will have the first plant west of the Mississippi, and the third in the nation to produce urea by this method. Completion of the plant is expected in the fall of 1958.

The urea unit will utilize ammonia and carbon dioxide as raw materials, both available at the existing anhydrous ammonia plant at Hercules.

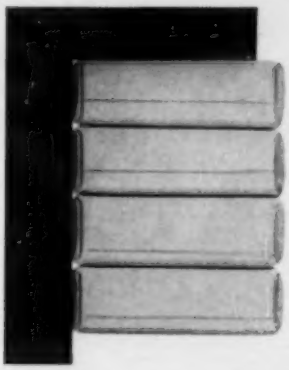
•

Aglime Consumption Gains

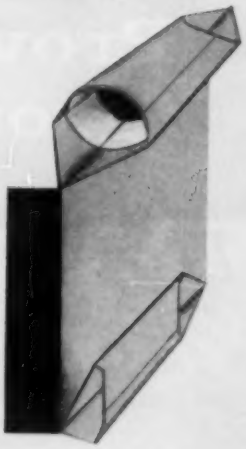
For the second consecutive year, consumption of liming materials increased over the preceding year by about 5 per cent, or nearly a million tons, according to a survey conducted by the National Lime Assn., Washington, D. C.

The largest increase occurred in the southern states.

St. Regis Pasted Valve Bags serve you four important ways—and cost less!



1. **"SQUARED-AWAY" BAGS STACK BETTER, SAVE ON STORAGE**—Squared up on all sides, St. Regis Pasted Valve Bags stack closer to save warehouse space. You save on shipping too, because they load more compactly on trucks or boxcars.



2. **NEW INSERT SLEEVE CUTS WASTE**—The new insert sleeve on St. Regis bags closes tight against the squared bag top. This means less siftage, cleaner packages, virtually no waste—important factors in building and keeping customer good will.

3. **IMPROVED MOISTURE BARRIER PREVENTS CAKING**—The asphalt laminated sheet locks out moisture, assures you of positive product protection, continued customer satisfaction.

4. **"SQUARED-AWAY" GIVES MORE DISPLAY, MORE SALES-APPEAL**—The all-square design of St. Regis bags gives you greater imprint area on all six sides. Your name and product information can appear bigger and bolder . . . your package more attractive to customers.

THE MAN FROM ST. REGIS—*See how St. Regis Pasted Valve Bags can cut your packing costs by calling the Man from St. Regis in your area. Ask him to show you the new Stepped-End Bag too—the strongest multiwall bag closure ever designed . . . another St. Regis development.*

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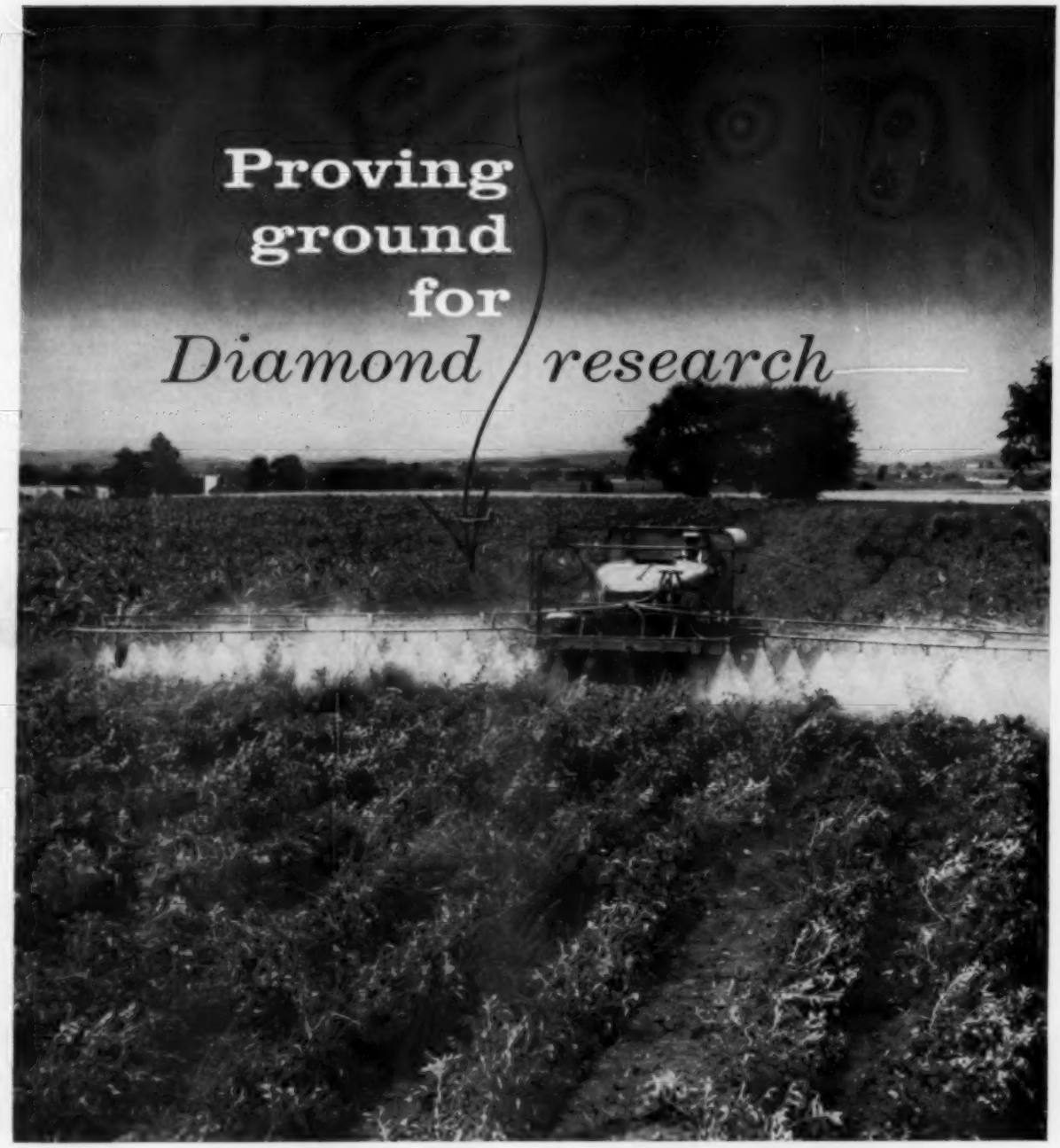

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- BHC
- Lindane
- Grain Fumigants
- Miticide K 101 (Ovex)
- 2,4-D Weed Killers
- 2,4,5-T Brush Killers
- Hexachlorobenzene
- Wettable powders, dust concentrates, emulsifiable concentrates and oil solutions based on our technical grade chemicals.

M.W.S.I.C. Approves Merger with N P.F.I.

By H. H. Slawson

MEMBERS of the Middle West Soil Improvement Committee, at their annual meeting in Chicago, Oct. 31, voted approval "in principle" of a plan for terminating its activities and the taking over of its program by the National Plant Food Institute. A second resolution, also approved, authorized dissolution of the Committee as a corporation.

Termination of the Middle West Committee's present activities will become effective Jan. 1, 1958. Until that date, approval was given to expenditure of funds to meet normal operating expenses and to discharge outstanding committments. Any funds and all assets remaining are to be disposed of on a "Plan of Distribution" to be approved by member firms with voting rights.

All tangible assets (excluding cash on hand) will be transferred to the NPFI while remaining assets will be disposed of by the Committee's present Board of Directors, for purposes which, the resolution says, "May include grants-in-aid to educational and research institutions for study and research on any problems related to the use of fertilizer." A report presented later by the Committee's auditor indicated that a considerable surplus fund will be available.

The plan for the merger provides that the NPFI will employ the committee's present staff at not less than existing wages and salaries and assume the Committee's publications under its lease for its Chicago office space.

The NPFI will also conduct the February, 1958, meeting between fertilizer manufacturers and state college agronomists which has been a feature of the Middle West Committee's program for years, and will continue to conduct this meeting annually "so long as members in the midwest region feel such meetings to be desirable."

The next meeting, as had been announced earlier will be held at the Edgewater Beach Hotel in Chicago, Feb. 13-14, 1958.

Business matters attended to at the Chicago meeting included selection of four men to fill vacancies on the Board of Directors. Those elected were R. A. Garn, Ohio Farm Bureau Cooperative Association, C. F. Martin, Miami Fertilizer Co., A. C. Norris, V. W. Norris & Son Co., and Frank Nelson, Rath Packing Co. As stated previously, after Jan. 1, 1958, the Board will serve as an advisory committee to the NPFI.

Mr. Beers also reviewed the Middle West Committee's well-planned education program of the past year and discussed results from the extensive promotional effort carried on with cooperation from newspapers, radio and television stations and with printed materials of various types.

New Modern Plant Where SER-X is Produced

SER-X is a potassium hydrous alumina silicate of the following analysis: SiO_2 73.08%, Al_2O_3 13.70%, Fe_2O_3 3.12%, TiO_2 0.54%, CaO 0.30%, MgO 1.14%, Na_2O 0.22%, K_2O 5.42%, Ign. Loss 2.54%, Fusion Point Cone 12.

Processed from Sericite ore, **SER-X** has an average particle size of 3.5 microns and a bulk density of 40 pounds per cubic foot. **SER-X** is inert, non-hydroscopic and non-shrinking. The particles are flat. Because of these physical and chemical properties it has proved ideal as a diluent in the formulation of agricultural insecticide dusts.

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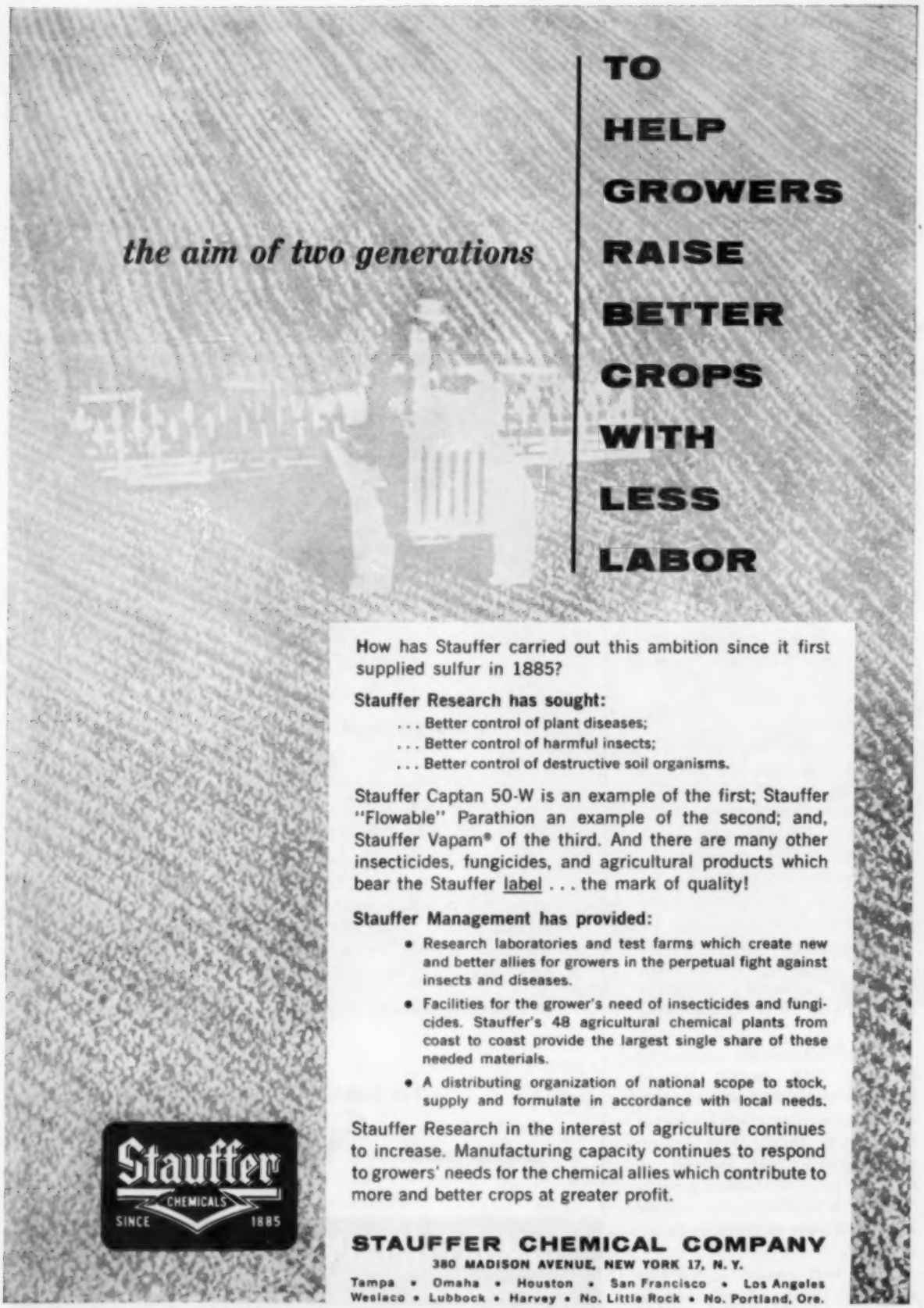
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Stauffer Captan 50-W is an example of the first; Stauffer "Flowable" Parathion an example of the second; and, Stauffer Vapam® of the third. And there are many other insecticides, fungicides, and agricultural products which bear the Stauffer label . . . the mark of quality!
Stauffer Management has provided:
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• A distributing organization of national scope to stock, supply and formulate in accordance with local needs.
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Surplus of Potash Anticipated for '58

RECENT increases in productive capacity of the potash industry, coupled with failure of demand to increase as had been anticipated, will result in an excess supply of potash salts for the fertilizer industry over the next year or two in the view of major American potash producers. Potash companies operating in the Carlsbad area have recently completed a series of expansion programs involving an investment of approximately $35,000,000 in new facilities, and raising the productive capacity of the domestic industry to some two and a half million tons a year. At the same time the new Canadian field in the Province of Saskatchewan (See June, 1957, issue, pg. 34) is being brought in and will increase the industry's productive capacity still further. Obviously unless there is an increase in demand, operations will have to be curtailed in the Carlsbad area when the new Canadian mines start shipping.

A recent article on the potash supply situation in October 23rd issue of the *Wall Street Journal* has attracted somewhat critical comment from potash producers who indicate that the current oversupply is by no means of the magnitude suggested by the *Journal's* article, which states that there are currently some 700,000 tons of potash in Carlsbad warehouses. Producers advise that the figure is more in the neighborhood of 500,000 tons, and point out that it is quite normal to have heavy supplies of potash above ground at this time of the year in preparation for the period of heaviest demand in the early spring.

While the short term outlook is for an excess supply, potash producers still feel that the long term picture is for continued expansion in potash use. The *Journal's* article quotes one potash company executive as being of the opinion that "if farmers were to increase their use of potash just to the levels recommended by the U. S. Dept. of Agriculture, it would more than take care of all the capacity the industry is building."

Officers and directors of Middle West Soil Improvement Committee, (left to right) Z. H. Beers, executive secretary, E. T. Potterson, Merle Blue, C. F. Martin, Louis Quiram, treasurer; R. E. Bennett, president; R. A. Garn, J. D. Stewart, Jr., Frank Nelson, W. W. Venable, R. G. Fitzgerald, vice-president; and Marshall A. Smith. A. C. Norris, not pictured. (Story of meeting appears on page 91.)

TYPE 41 CLAY

In making organic concentrates using benzene hexachloride, chlordane, toxaphene, and other similar materials, it is important to have the concentrates free flowing.

TYPE 41 Clay can be combined with more costly diluents, such as Fuller's earth, and the result will be a free-flowing concentrate, at a lower cost to the producer.

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Florida Horticultural Society Hears Panel on Insect Resistance

A SYMPOSIUM on insect resistance was a highlight of the seventieth annual meeting of the Florida State Horticultural Society at Miami Beach, Oct. 29 to 31.

James E. Brogdon, Agricultural Extension Service, Gainesville moderated the symposium which included reports by Dale M. Norris Jr., Potato Investigations Laboratory, Hastings; D. O. Wolfenbarger, Sub-Tropical Experiment Station, Homestead; W. G. Genung, Everglades Experiment Station, Belle Glade; E. G. Kelsheimer, Gulf Coast Experiment Station, Bradenton; and John W. Wilson, Central Florida Experiment Station, Sanford.

Among the insects mentioned by Mr. Genung which have indicated development of resistance to insecticides and the materials to which they appear resistant were; the cabbage looper—DDT, leafhopper of beans—DDT, serpentine leafminer—toxaphene, and imported cabbage worm—DDT.

Mr. Norris said that there is conclusive evidence that once a species population is repeatedly exposed to an insecticide, natural selection of tolerant individuals occurs and the trend, however slow, is towards a population dominated by tolerant individuals.

Speaking on what should be done about the resistance problem, Mr. Wilson recommended the development of new chemicals and the use of alternate chemicals on insects.

E. G. Kelsheimer said that although resistance is an established fact, other factors contribute to poor control. He mentioned the speed of the sprayer, improper nozzle action, rough terrain, too much pressure, and incompatibility of materials used as contributors to poor control.

D. S. Burgess of the Gulf Coast Experiment Station, Bradenton, spoke on chemical weed control in pole beans and tomatoes and said that EPTC and simazin were effective when used pre- and post-emergence in pole beans, EPTC, Simazin, Herbisan and Karmex DW were effective as post-emergence sprays on tomatoes at time of staking.

John R. King of the Florida Citrus Experiment Station, Lake Alfred, presented a paper which he had prepared together with Roger B. Johnson on the comparison of experimental miticides for the control of purple mite. Field tests using seventeen miticides were conducted in the Indian River and Ridge areas Of the miticides used, Tedion, Trithion, and Kelthane were the most promising, Mr. King said.

A tank- mix ferbam made by reacting sodium dimethyl dithiocarbamate with iron sulfate was as good as normal ferbam for the control of early blight, according to John F. Darby of the Sanford station. Mr. Darby said that the cost of SDD plus iron sulfate was more than five dollars less per acre per season than ferbam. Other outstanding fungicides cited by Mr. Darby were; maneb, ziram, mixtures of equal parts of ziram and ferbam, maneb and ferbam, SDD reacted with zinc sulfate and SDD reacted with equal parts of iron, zinc, and manganese sulfates.

Current information on barriers for the burrowing nematode was presented at the meeting by R. F. Suit and T. L. Brooks of the Lake Alfred station. They said that barriers of eighth and twelve-foot widths have not been successful although some of this type are still under test. The chemical soil treatment used in barrier experiments is an application of a mixture of D-D plus nemagon followed in six months with a D-D application; alternating the applications every six months. It is thought that a barrier 100 feet wide might be satisfactory if it were properly maintained.

Left to Right: Three of the members of panel speaking on insect resistance: W. G. Genung, Everglades Experiment Station; J. R. King, Florida Citrus Experiment Station and E. G. Kelsheimer, Gulf Coast Experiment Station, Bradenton, Fla.

•

Antara Names Distributor

Western Solvents & Chemicals Co., Detroit, has been appointed distributor for Igepal nonionic surfactants by Antara Chemicals, a division of General Aniline & Film Corp.

Drum Stocks of all Igepal CO and CA surfactants will now be available at Western's warehouse and bulk depot, with all orders now being made via Western's trucks.

•

Wearly Named Joy President

William L. Wearly has been elected president of the Joy Manufacturing Co., Pittsburgh, Pa. He replaces John Lawrence who resigned recently.

A B. Drastrup has been elected executive vice president to fill the position formerly held by Mr. Wearly.

•

To Build Urea Plant

The Monsanto Chemical Co., St. Louis, Mo., has announced plans to build a urea plant at El Dorado, Ark.

Construction of the plant, which will have a capacity of 100 tons a day, will get under way before the end of the year. The new facility will produce urea in both prill and solution forms.

this shipment of 50% Heptachlor concentrate formulated with

MICRO-CEL

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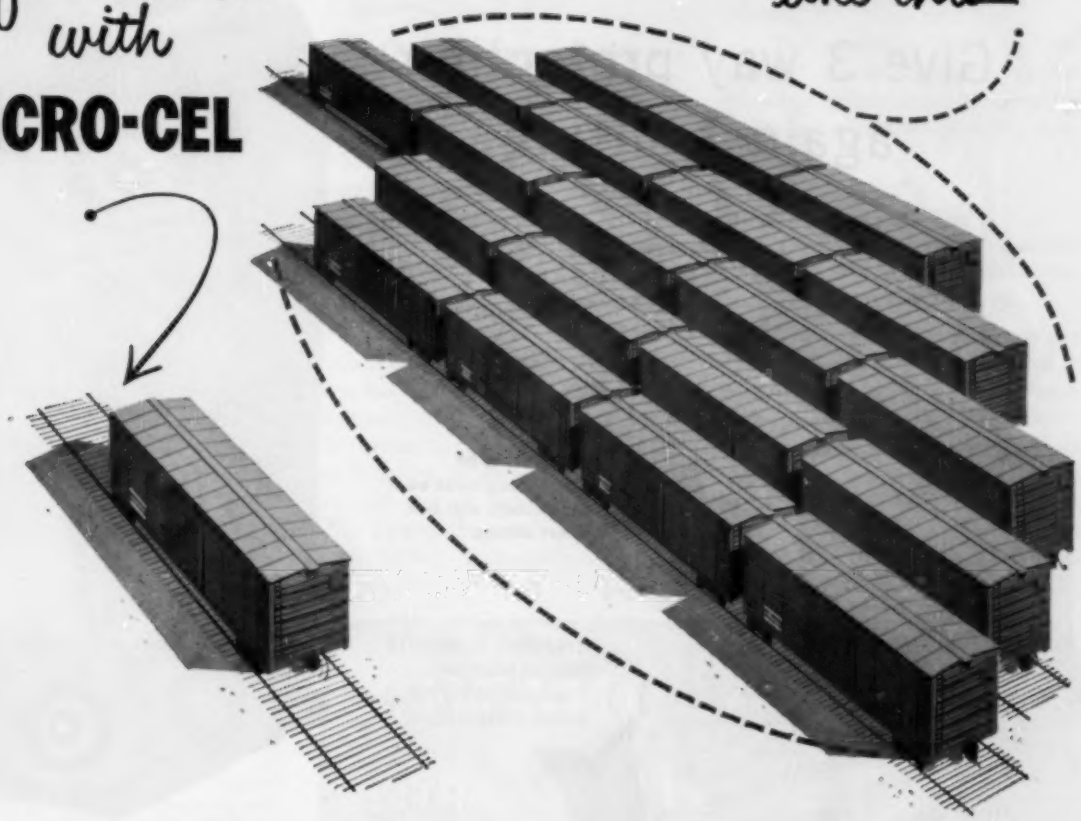

The advantages of formulating insecticide dusts at the higher concentrations obtainable with Micro-Cel* is graphically demonstrated by the freight cars above. One car of 50% Heptachlor when let down to a 2½% poison at the point of application produces the equivalent of 20 cars of insecticide in the field. Since Micro-Cel costs no more than many other diluents, the substantial freight savings mean extra profits for you.

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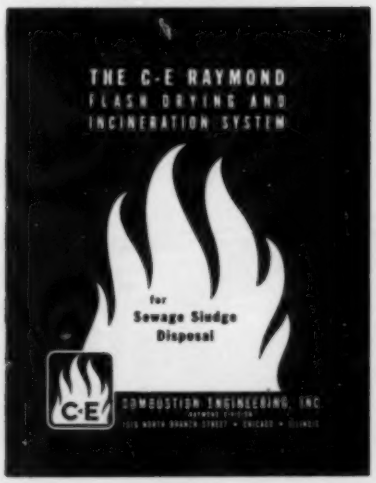

The Raymond Division of Combustion Engineering, Inc., Chicago, has prepared an illustrated brochure to describe the C-E Raymond Flash Drying and Incineration System, a solution to the problem of final disposal of sludge from sewage treatment plants.

Through the use of the Raymond system, sludge may be dried for agricultural use.

The bulletin outlines the problem of sewage sludge disposal. Diagrams and photographs explain the C-E Raymond system and typical installations are illustrated and described.

•

Carbide Offers Booklet

A 28-page "Physical Properties" booklet is being offered by the Union Carbide Chemicals Co., division of Union Carbide Corp., New York. The booklet presents physical property data on more than 350 organic chemicals.

•

New Aluminum Booklet

A technical booklet on the use of aluminum for tanks and vessels is now available to interested individuals, business firms and engineering schools.

The booklet, prepared by Reynolds Metals Co., is intended to serve as a basic technical guide to design, fabrication and applications of aluminum tanks and vessels. It lists more than 100 general types of chemicals for which aluminum applications are particularly advantageous.

Copies of the booklet, "Reynolds Aluminum for Tanks and Vessels," may be obtained without cost by writing to the company at 2500 South Third St., Louisville, Ky.

•

Sweco Separator Catalog

A Catalog describing the new 30 inch Sweco Vibrating Screen Separators has been issued by Southwestern Engineering Co., Los Angeles, Calif. This new equipment gives an intermediate size between the Company's 18 inch and 48 inch diameter units. The 2-color illustrated Catalog Bulletin S574-1, is available from the company.

Optical Testing Instrument

Alfred Hofmann & Co., West New York, N. J., has introduced on the American market a Swiss perfected optical precision unit which combines into a portable housing a microscope, projector, comparator, and camera.

The instrument, called the "projectina," can be adapted by the interchange of optical and photographic equipment to perform all of the above tasks.

•

All-Purpose Emulsifier

A new water-in-oil emulsifier, Emocithin, is being offered by Morningstar, Nicol, Inc., New York.

Designed for preparations where aqueous phases are finely dispersed in continuous oil or fat phases of vegetable, animal, or mineral oils, emocithin produces W/O emulsions which will not separate at temperatures up to 200 degrees F. Technical information, based on European experience with the product, is available from the company.

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Many fertilizer manufacturers can now cut their costs by formulating with Phosphatic Fertilizer Solution (wet-process phosphoric acid). Use of this chemical from U.S.I.'s new plant will, in many cases, enable you to produce standard or special granular formulas at lower cost. It will also allow you to make higher analysis grades of fertilizer. To help you determine if and how you can profit by using phosphoric, the U.S.I. Technical Service Engineers are ready to work with you.

And you can be assured of a steady supply of this basic fertilizer material . . . because the entire production of Phosphatic Fertilizer Solution at the new U.S.I. plant at Tuscola, Illinois, is available for non-captive commercial uses. This amounts to 30,000 tons of P_2O_5 per year.

You can, in fact, get *all* of the following fertilizer basics in addition to PFS on *short notice locally* from U.S.I. Anhydrous and Aqua Ammonia . . . Ammonium Nitrate . . . Nitrogen Solutions . . . Sulfuric Acid . . . and Nitric Acid.

CALL IN THE U.S.I. MAN NOW

May we suggest that you get in touch with your U.S.I. man. Let him work out optimum formulations with you. He's experienced in determining the factors that make up formula cost. He will also be glad to assist you during your trial runs.

If your costs can be lowered by using PFS (and they probably can) he'll be able to help you find out. Quickly. Reliably.

If you would like the U.S.I. man to work with you, write to us—or better still telephone collect.

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99 Park Avenue, New York 16, N. Y.

New Fuller Bulk Blender

A new concept in the blending of dry bulk pulverized materials reduces deviations in unblended components down to ± 2%, according to the Fuller Co., Catasauqua, Pa., a wholly-owned subsidiary of General American Transportation Corp.

The new concept, known as "Fuller Airmerge Quadrant Blending," is basically an aeration system and can be used on any materials which can be fluidized by compressed air.

Capable of blending materials with different bulk densities and finenesses, the fast new Airmerge system works at high tonnage capacity to reduce manhours of labor per ton and at the same time cut power consumption.

•

Thayer Liquid Batch Scale

The Thayer Scale Corp., Pembroke, Mass., is offering a complete line of scale leverage mechanisms which range from scales with capacity of ten pounds up to scales with a total load capacity of 50,000 pounds in a single leverage system arrangement.

The scales employ fixture plates and have been adapted to the weighing of liquid storage and process control tanks such as the Model B4L liquid batch scale which can be furnished either as a simple batching control scale, as an accumulative weighing scale, or as a loss in weight feeder for highly viscous or hard to handle liquids.

•

New Clarklift Attachment

A Pul-Pac attachment for palletless materials handling has been introduced by the Industrial Truck division of the Clark Equipment Co., Battle Creek, Mich., for use on the company's Clarklift and Carloader fork trucks.

The device consists of a load carrying plate, pusher rack, and gripper jaw. Loads are carried on a thin steel sheet instead of conventional pallets, reducing storage space requirements and replacement of worn pallets.

A flap at the edge of the sheet is gripped by hydraulically-actuated jaws and the sheet plus its load is pulled onto the load carrying plate. Load removal is accomplished by the upright pusher rack which has up to 50-inches of forward travel.

•

Lummus Pilot Plant Folder

The Lummus Co., New York, has published a booklet depicting their new engineering development center at Newark, N. J.

The illustrated brochure describes the center which is located in a 150,000 square-foot building that recently was opened to replace the company's smaller quarters in Bayonne, N. J., where Lummus pilot plant work had been carried on since 1930.

•

Sole Emulsifier Bulletin

The Sole Chemical Corp., Chicago, has published a technical bulletin describing a soapless emulsifier, Sole-Mulse B.

The emulsifier is built for a wide spectrum of hydrocarbon solvents and is said to provide excellent hard or soft water emulsifiability in low use-levels.

Two New Emulsifiers

The Emulsol Chemical Corp., Chicago, (division of Witco Chemical Company) has developed a new pair of emulsifiers, Emcols H-900 and H-902, for insecticide formulations.

Emcols H-900 and H-902 may be used separately or in combination for a number of insecticides, among them Aldrin, BHC, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Lindane, Parathion, Methyl Parathion and Toxaphene.

•

Mill Automation Bulletin

A 12-page reprint of a technical report describing the latest digital printout techniques for automatic proportioning control is now available from Richardson Scale Co., Clifton, N. J.

Called "Automation In The Mill," it is a design study of a specialized control problem and is illustrated with 12 photographs and four diagrams. The reprint shows how flexible automation can meet the demand for increased production at lower costs.

IT'S HERE - IT'S PROVEN

ITS Y-M CO'S. 500 LB. PORTABLE CUT-BACK DUST BLENDING SYSTEM

Capacity — Four to six 500 lb. batches per hour

Space Requirement — 6'6" x 10'6" x 15' O. A. Ht.

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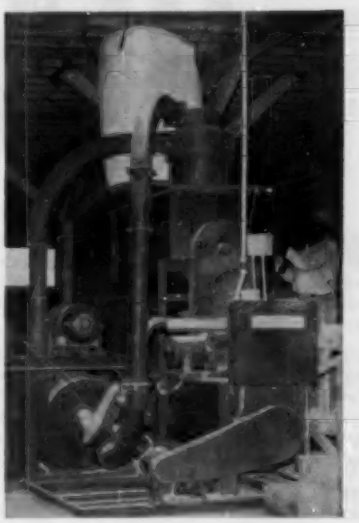
System Includes **— Dust hood at loading station; Sifter; Pre-Mixer at floor level; Pneumatic Conveyor-Blender; After-Mixer with dust collector; Dust hood at packaging station, etc; All motors wired to panel box with push button controls.**



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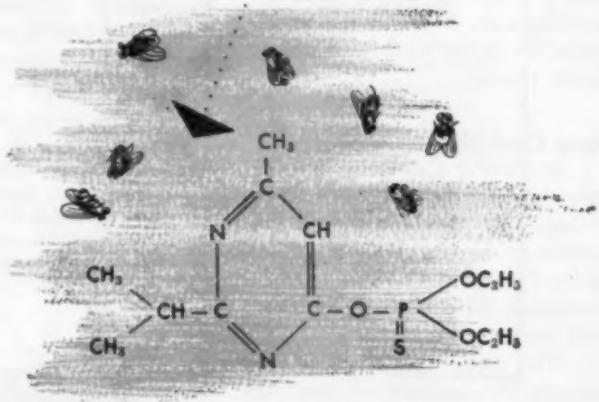
What a 'killer' this complex chemical is turning out to be! And quite impartial as to its victims: — houseflies, barnflies, fruitflies, aphids, mites, ants, beetles, chinch bugs, roaches, and many other pests that bother man and beast. It kills them dead!

As with the former chemicals which made such notable headway in man's fight to subdue these destructive pests, Sulphur is very much in the picture—here is one of the many variations of the benzene ring . . . the Diazinon Formula. That letter "S" tied in with the letter "P" discloses the all-important thiophosphate.

Sulphur, often called one of the Four Pillars of the Processing Industry, is benefiting mankind in many ways. None is more important than that of controlling crop-destroying pests.

**A product of the Geigy Chemical Corporation.*



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N.Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

BREVITIES

THE DOW CHEMICAL COMPANY, Midland, Mich., has expanded its plant capacity at a rate considerably faster than the industry during the post-war period, according to a study issued by Harris, Upham & Co., an investment brokerage firm. The company is described as the fourth largest American chemical company in respect to dollar sales.

AC

WELDON L. WADLEIGH has joined the Stauffer Chemical Company, New York, as a salesman for the agricultural division in the Midwest, covering Illinois and Indiana.

AC

THE RANGE FERTILIZATION booklet, recently published by the California Association, is now in its second printing. A product of the association's Soil Improvement Committee, the initial 15,000 copies were distributed in about 30 days to range owners and livestock producers of the west, through the fertilizer industry.

AC

RADIOACTIVE TRACERS are being used by two staff members of the department of entomology at Kansas State College, Manhattan, Kans., in an insecticide study project that recently was renewed for the fourth time by the Atomic Energy Commission.

AC

DR. RICHARD L. ADAMS, retired University of California agricultural economist, died last month of a cerebral hemorrhage aboard a ship. He was 74 years old.

AC

STOCKHOLDERS of the International Minerals and Chemical Corp., Chicago, recently voted an increase in the number of common shares from 3 million to 5 million. Louis Ware, IMC president, told the 48th annual meeting of shareholders that the increased stock authorization was not requested for any immediate need but to make such an issue possible in event of future contingencies "such as the acquisition of desirable properties or processes."

AC

JAMES E. NALL, former director of staff departments of Standard Fruit and Steamship Co., New Orleans, has been elected vice-president and gengeneral manager of the Fertilizer Division of Virginia-Carolina Chemical Corp., Richmond, Va.

AC

DR. JOSEPH E. MOORE has joined the California Spray-Chemical Corp., Richmond, Calif., as a research chemist. He was previously with the U. S. Department of Agriculture.

AC

THE PLATTE CHEMICAL CO., Salt Lake City, Utah, has purchased a sulfuric acid plant site east of Casper, Wyo.

AC

TWO NEW CORPORATIONS, the New York Organic Corp. and Gibberellin Corp. of America, both of New York, have been granted charters of incorporation. Both list capital stock of 200 shares.

AC

CHARLES MRUK has joined the Nitroform Agricultural Chemicals division of the Woonsocket Color & Chemical Co., Woonsocket, R. I., as an agronomist.

AC

THE TEXAS GULF SULPHUR CO., New York, has announced that C. F. Fogarty, E. C. Meagher, and E. F. Vanderstucken Jr. have been elected vice presidents of the company.

AC

INDIA has accepted the French San Goban company's tender to supply and erect a fertilizer plant at the Nangal project in the Punjab, to be completed by April, 1960.

specialists in magnesia for agriculture

EMJEO (80/82% Magnesium Sulphate) Calcined Brucite (fertilizer grade) 65% MgO

POTNIT

(95% Nitrate of Potash) for Special Mixtures and Soluble Fertilizers • Other Fertilizer Materials

Insecticides
Fungicides
EXPORT
•
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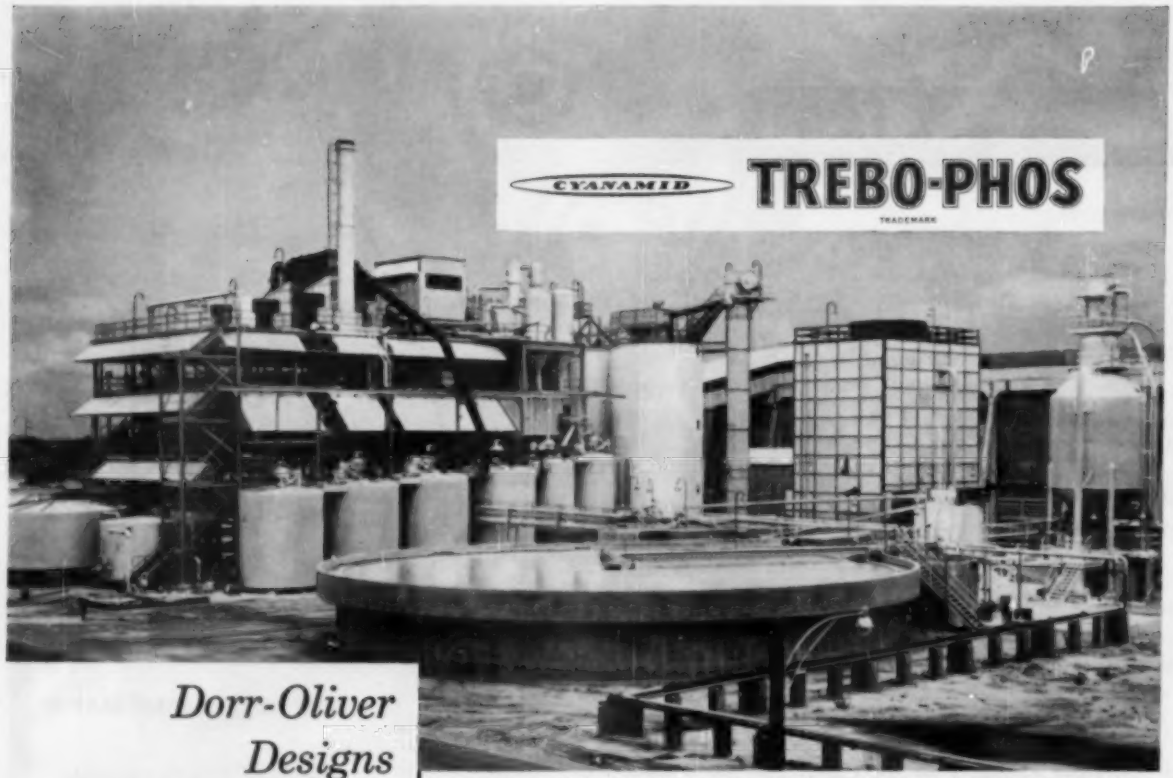
Berkshire Chemicals
INC.
420 LEXINGTON AVE., NEW YORK 17, N.Y.
BOSTON • CHICAGO • CLEVELAND
PHILADELPHIA • SAN FRANCISCO



The new D-O designed and equipped triple superphosphate plant at Brewster, Florida. The open air building was specially designed for light, ventilation and economy. Note the water recovery and neutralization section in the foreground, the outdoor reaction system, and the two Doyle Scrubbers on top of the building.

Dorr-Oliver Designs and Engineers

NEW 200,000 TON PER YEAR TRIPLE SUPER-PHOSPHATE PLANT

for American Cyanamid Company ... at Brewster, Florida

The new Brewster, Florida plant of the American Cyanamid Company, one of the nation's largest chemical corporations, reached its design capacity of 200,000 tons per year of triple superphosphate in less than 3 months after initial start-up. Operating with the largest single stream phosphoric acid reaction system, made possible by a new type of vacuum cooling device, this plant produces a non-granular fertilizer which is ideal for subsequent ammoniation and compounding. The daily production of 600 tons consumes 220 TPD of high strength P_2O_5, and 600 TPD of H_2SO_4. Dorr-Oliver's 40 years of experience in the field of phosphoric acid and concentrated fertilizer production was fully utilized in the design of this plant.

Already established as one of the cleanest fertilizer plants ever designed, the Brewster mill far exceeds all requirements of the Florida Pollution Authority. Fumes and gases are scrubbed in series through two Doyle Scrubbers which each handle 25,000 CFM. Acid wastes are neutralized and clarified prior to discharge. An absolute minimum of water is consumed as 3,200 gpm is reclaimed in a 90′ dia. Dorr Clarifier. Make-up water in the water reclamation plant totals 800 gpm or only 20% of the total process water. Another D-O development is the Dorr-Oliver Traveling Pan Filter installation, where three 18 square meter units with a filtration area of 195 square feet are installed. Two of these units handle 1,100 tons of gypsum per day.

If you are considering entering the fast growing fertilizer field — or if you plan to expand present plant facilities — it will pay you to check with Dorr-Oliver. Write for Bulletin No. 8000, or better still, let us send an engineer to discuss your problem from the standpoint of economics and process. No obligation, of course.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

ROUND TABLE

(*From Page 34*)

solutions and anhydrous ammonia. In his review, he cautioned that in handling these materials, the working pressure be kept well above the vapor pressure to insure against vapor bubbles forming in the handling systems. He stated too that this working pressure should also be constant since pressure fluctuation will cause flow fluctuation. Details of metering units at F. S. Royster Guano were reviewed.

On the entertainment side of the meeting, Round Table members were guests for cocktails and a luncheon on Thursday sponsored by the Potash Company of America. On Friday, the following nitrogen producers sponsored lunch and cocktails: American Cyanamid Co.; Grace Chemical Co.; Olin Mathieson Chemical Co.; Phillips Chemical Co.; Spencer Chemical Co.; Texas Co.; USI; du Pont de Nemours; and the Nitrogen Division of Allied Chemical & Dye Corp.

EDITORIAL

(*Continued from Page 27*)

sessions would be constantly amazed at this group. Attendance ran heavy from the opening gong until late each afternoon, audience participation was generous, and the program itself showed the result of intelligent planning as participants discussed some eighty-four questions, all related to production and plant operation.

We hope those who originally organized the group and who continue to guide its course will keep the character of the organization unchanged. We go to enough meetings already where the salesmen outnumber the active participants two or three to one; where the sergeant-at-arms has to beat the bushes to get a corporal's guard in to the meeting room to hear some guest speaker harangue them on a topic in which few are actually interested; and where the friendships and social contacts to be gained are about the only reason for attendance.

Here is an organization built along different lines. May it keep its unique character over the years.

APPLICATION EQUIPMENT

(*From Page 30*)

tween the materials of which they are constructed. Erosion, causing overdosage and pressure drop, can be retarded significantly by the use of hardened stainless steel, ceramics, and tungsten carbide. The use of such materials may not always be warranted, but for applying wettable-powder suspensions and sprays containing dirty water they have distinct advantages.

It is hoped that this brief review of equipment, based on findings of the Agricultural Engineering Research Division and the Plant Pest Control Division of the U. S. Department of Agriculture, will indicate the necessity of increased developmental work. Closely allied with such a need—in fact, an integral part thereof—is the need for continuing studies on treatment methods. For example, existing laboratory equipment can produce spray drops with a diameter of either 500 or 33 microns, but the former applied at 2 gallons per acre on a flat surface will deposit only 18 drops per square inch whereas the latter will deposit 64,000 drops. The best answer usually lies somewhere in between these two extremes.

A further study of methods may reveal that for a certain purpose granulated material applied to the soil gives better results than spray applied to the foliage. Hence, the most efficient spray machine may give poorer *end* results than a mediocre granule applicator.

In addition to a continuing study of methods, requiring the cooperation of engineering and biology, closer attention must be given to the subject of residues. Not so important, perhaps, to the cotton grower as to the growers of fruit, vegetables, and livestock, he may nevertheless be growing crops with low-residue tolerances adjacent to his cotton fields or he may be involved in the risk of post-harvest grazing or the feeding of gin trash.

Thus, equipment with a high standard of precision will be required to an increasing degree in the future. Engineers can design such equipment

NOW IS THE TIME TO WRITE TABUTREX

(LIVESTOCK SPRAY)

LABELS

TABUTREX is the *non-toxic* insect repellent base which is revolutionizing the concept of livestock fly control by setting up an *invisible barrier against flies.*

TABUTREX makes an economical, unexcelled spray effective in barns *as well as in the pasture.*

TABUTREX is *approved* for use on dairy and beef cattle.

TABUTREX presents *no residue problem.*

Get ready NOW for the 1958 fly season.

MAKE PROFITS WITH TABUTREX IN 1958!

WRITE Now for new information on TABUTREX formulations and Labeling

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SYSTOX*

Registration Status

Introduced in 1951, SYSTOX has given consistent and outstandingly effective control of mites, aphids and leafhoppers on a wide variety of crops. The first systemic insecticide ever approved for use on a food crop, SYSTOX registrations now include:

Alfalfa Hay
Almonds
Apples
Beans
Broccoli
Brussels Sprouts
Cabbage
Cauliflower
Clover Hay
Cotton
Grapefruit
Grapes
Hops
Lemons
Lettuce
Muskmelons
Non-Bearing Fruits
Oranges
Ornamentals
Pears
Pecans
Pineapples
Potatoes
Seed Alfalfa
Strawberries
Walnuts

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CHEMAGRO CORPORATION

"Chemicals for Agriculture—Exclusively!"

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and, as revealed in these conferences and in reports of other fields of interest, they can design machines that will perform almost any function. However, in agricultural mechanics there are economic limitations and also limitations in trained manpower. Furthermore, applicator machines and methods must be relatively simple—for, as we all know, the number of persons who will adopt them is likely to vary inversely with their complexity.★★

References:

Black, D. T. EFFECT OF PESTICIDES ON APPLICATION EQUIPMENT. U. S. Dept. Agr. ARS 42-6: 5 pp. 1956.

U. S. Dept. Agr. HOW TO SPRAY THE AIRCRAFT WAY. Farmers' Bull. 2062: 32 pp. 1954.

AMMONIUM SULFATE

(*From Page 49*)

ring and fighting hard for its share of it. The percentage of granulated fertilizer is at present still small, and in the eastern seaboard and Gulf states the majority of the fertilizer grades is on the low side. This means many of the old dry-mixing plants in these areas continue to use sulfate of ammonia because of its acknowledged superiority in producing non-caking, old-style mixtures. But in the long-range viewpoint, it is inevitable that most of these old-time mixing plants will have to give way to the more efficient, granulating and ammoniating processes. By-product sulfate of ammonia producers should meanwhile find it expedient to explore all means for diversifying their operations, such as up-grading to a 26 per cent nitrogen Leunasaltpeter type, or producing a granulated sulfate of ammonia-diammonium phosphate mixture of the 20-20-0 grade, or even process their ammonia to nitric acid, thus permitting the production of an ammonia-ammonium nitrate solution for sale to fertilizer manufacturers. Some factors in the steel industry are pioneering in these changes: Colorado Fuel and Iron has already converted to diammonium phosphate. Phosphorus from an electric furnace source in Idaho is burned to phosphoric acid at the C.F.I. Pueblo, Colorado, plant where it is combined with coke-oven ammonia to produce diammonium phosphate. The Ford Motor Company at its Dearborn plant has also converted to diammonium phosphate, using furnace phosphoric acid in place of sulfuric for scrubbing the coke-oven gas. The Kaiser Steel Plant at Fontana, California, has installed facilties to produce sulfate of ammonia and diammonia phosphate alternately without interruption of production. These three pioneering companies have demonstrated to the steel industry at least one way to meet new conditions. Perhaps they reveal as well as any other pointer, where the future lies for by-product coke-oven ammonia.

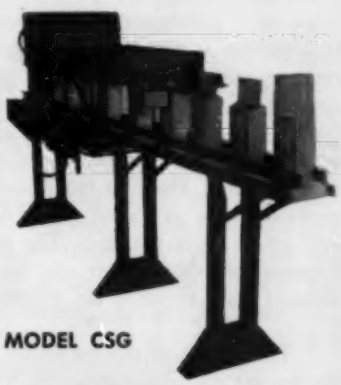
Exports

DEMAND from abroad has helped to move sizeable tonnage of ammonium sulfate from the domestic market. Exports in 1955 amounted to 612,000 tons of which 60.5 per cent represented synthetic and 39.5 per cent by-product material.

The United States synthetic ammonia producers in 1956 produced 1,100,000 tons of sulfate and the by-product industry, 822,500 tons. Total sales in 1955 reached the 2,041,000 tons level and that is still a substantial tonnage for which to find profitable markets.

Trends

DURING the past decade, the total plant food content of mixed fertilizers has steadily advanced, with the nitrogen content increased by a total average of 72 per cent. But the application of straight nitrogen to the soil during the same period zoomed to a spectacular 250 per cent. In the 1955-56 season, direct application nitrogen totaled 1,137,000 tons and that in mixed goods, 815,000 tons. The trend in the nitrogen sources used in this country for direct application indicates clearly that ammonium nitrate will continue for sometime to be the principal source, sulfate of ammonia and nitrate of soda will vie with anhydrous ammonia and solutions for second place, and urea will increase at an accelerating rate. ★★



MODEL CSG

The FRY MODEL CSG is a semi-automatic closing machine that double-folds, heat seals the inside of the bag and glues the second fold to the first. The result is a neat closure... heat-sealed for sift-proofness and glued for additional shipping or carrying strength. Operation is continuous and no reciprocating or cyclic motions are employed.

Adjustable for various bag heights. Model CSG also handles non-heatsealable bags by gluing folds.

FRY
SEALER-GLUER
BAG CLOSING
Machine

Ideal for

- INSECTICIDES
- FERTILIZERS
- CHEMICALS
- PLANT FOODS
- BRIQUETS
- MISCELLANEOUS POWDERS
- GRANULAR PRODUCTS

Write for informative folder on this and other models. Please submit bag and product samples.

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These Two Case Histories

how to IMPROVE DISTRIBUTION of

- Insecticides
- Fungicides
- Herbicides
- Fumigants

U. S. UNITED STATES RUBBER
Naugatuck Chemical Division

Naugatuck Chemical uses Terra-Lite vermiculite (No. 4) as a carrier for ALANAP®-20G (a pre-emergence herbicide). It offers high, even absorption...formulates easily without caking or balling... gives better chemical distribution for more adequate weed control.

R RIVERDALE CHEMICAL COMPANY

Uses Terra-Lite vermiculite (No. 4) for making 40% insecticide sold to fertilizer manufacturers. High concentration desirable for blending with fertilizers. Free-flowing vermiculite permits wider coverage of aldrin due to low density and number of particles per lb. in vermiculite.

Leading producers of agricultural chemicals endorse Terra-Lite vermiculite carriers. It cuts carrier costs, increases coverage—offers a way to save time, labor, money and develop business for your firm in the booming new granular field.

Mail coupon for free working samples and complete data showing how vermiculite will readily fit into your operations.

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WASHINGTON REPORT

(From Page 58)

posal of the U. S. Department of Agriculture. Here again, the trouble comes from the small package field, rather than from those serving the agricultural market. Matter of fact, the headaches originating in the small package field are causing more and more companies to re-evaluate this phase of marketing.

Essentially the USDA does not want labels of pesticides to state that these ingredients are endorsed by the U. S. Department of Agriculture.

Also, while the proposal is made by the USDA, the implication is that the intent would also apply to the Food & Drug Administration's jurisdiction in the matter of residue tolerances, whereby products could not state that they had the approval of the Food & Drug Administration.

While most manufacturers solicit the endorsement of county agents and agricultural colleges by establishing grant-in-aid work justifying such statements, the sale of a chemical based on a government endorsement is dangerous in that it gives the government tremendous power over the marketing of agricultural chemicals. Some of the industry is saying the government now has too much authority in this field. However the industry position when presented by NAC will reflect latest thinking. The seriousness of this matter is being brought home to all in the industry.

* * * * *

The USDA is moving ahead in the fire ant eradication program. Operations are underway in the states, and in addition a chemical laboratory for the study of technical developments is being set up at Gulfport, Mississippi. While this is not strictly a research laboratory, it has been established to get quick answers on problems that develop as the eradication campaign progresses. Having such a laboratory in the area so that quick results can be obtained, is looked upon as a means of speeding the success of field operations.

There are some here in Washington who wonder how far federal-state eradication programs will go.

EASTERN ESA

(From Page 86A)

on fish, and a minor effect on wildlife due to the low toxicity to mammals. On the other hand, he pointed out that aldrin, and chlordane were harmful to ducks, and although heptachlor has no effect on warm blooded animals it is harmful to fish. He urged that in control programs, spraying be restricted to areas under control, that there be no direct spraying of lakes and aquatic areas; that either ground application equipment or small planes be used on areas bordering lakes; and that planes in these areas be used when wind velocity is low.

C. C. Alexander, Geigy Agricultural Chemical Co., retiring chairman, presided at the general sessions of this 29th meeting of the association. Newly elected officers for 1958 were introduced: Neely Turner, Connecticut Agricultural Experiment Station, is the new chairman; Reece I. Sailer, U. S. National Museum is vice chairman, and B. F. Driggers, Rutgers University, continues as secretary-treasurer. Officers were pleased to report that membership of the branch exceeds 1100, and that the Eastern branch leads the other ESA branches in membership. The 1958 meeting was announced to be held November 24-25 at the Lord Baltimore, Baltimore, Md.★★

GARDEN SHOW

(From Page 51)

a 5-10-10 formula for azalea, camellia and rhododendron, and a 7-7-7 formula for evergreens. A. W. Besthoff, son of the company president, pointed out the new package designs with large print and pictures in color for increased consumer appeal. Faesy & Besthoff, he advised, is the only concern in the home garden field which uses resealable tin-tie top bags.

B. G. Pratt Co., Paterson, N. J., featured their familiar "Scalecide" dormant oil spray among 40 other garden chemicals. Henry B. Pratt, vice president, said the company recently added Shell's nematocide,, "Nemagon," to its own regular

line. This has been available in small consumer packages for about a year and, as interest in nematode control grows with education, he foresees a promising future for this new pesticide.

Goulard & Olena, Inc., Skillman, N. J., showed their standard line of garden chemicals which now includes two new products, an African violet plant food and strawberry food with chlordane. Alexander Goulard, president.

Kelly-Western Seed Co., Salt Lake City, Utah, drew considerable attention with a new "Pax" pre-emergent crabgrass control compound. The formulation, according to Martin Berchin, of the sales staff, includes arsenicals to kill the dormant seed before it germinates, chlordane to kill lawn insects, and ammonium sulphate to nourish grasses.

Velsicol Chemical Corp., Chicago, presented their unique 1958 dealer "sales builder program," designed to assist formulators who use Velsicol's chlordane in products marketed under their own brand names. For the dealer there will be a "refresher" sales training course; a monthly insect control information service; a sales incentive "show and sell" contest; an abundance of colorful educational literature for the consumer, dealing with chlordane's part in controlling ants, lawn and household insects, termites, crab grass and other pests. With these will go store posters, novel mobiles using giant size insect models, also other point-of-sale materials, all stressing chlordane.

Among other well known makes of agricultural chemicals, packaged for the week-end gardener, the Chicago show included Acme Quality Paints, Inc., Detroit, Mich., American Chemical Paint Co., Ambler, Pa., and American Cyanamid Co., New York. All offered varied products in new packages, with service programs designed to help the dealer sell more garden supply merchandise.

Exhibitors of specialty products ranged from Science Products Co., Chicago, offering hormones for production of seedless tomatoes and the like, to Plantabbs Corp., Baltimore, Md., who make plant food for indoor plants, bulbs, orchids, etc., in tablet form.

National Bird Control Laboratories, Skokie, Ill., promoted "Roost-No-more" liquid bird repellent, which gained prominence from its use during the 1956 inauguration parade in Washington.

Leading the list of fertilizer industry representatives participating in the big Chicago show was the National Plant Food Institute, with an institutional display portraying the important part fertilizer plays in the national economy.

An automatic projector told the story, with pictures and voice, and a background wall chart outlined where the ingredients in "John Doe" brand fertilizer come from. Copies of various Institute publications were available for examination.

Smith-Douglas Co., Norfolk, Va., delegated their Streator, Ill., branch plant to introduce their "Nutro" line of packaged plants to the middle west, where the products are now to be promoted aggressively after long use in eastern states. This line includes "Nutro" pellets, "Nutro-line" liquid plant food, a water soluble "Instant Nutro" and "Nutro-nite" with 10 percent nitrogen from animal wastes. Wholesale distribution will be on an exclusive basis and the products will be sold only in hardware, garden supply and seed stores.

Armour Fertilizer Works promoted "Vertagreen" plant food and Swift & Co. had their "Vigoro" line on display. Stadler Fertilizer Co., Cleveland, showed both organic and inorganic plant foods.

For the advocates of organic fertilizers numerous manufacturers were on hand to show their wares. Notable in this group was their use of new plastic bags for their products. Plastic is something bacteria can't eat up, it was explained.

Among applicator manufacturers H. D. Hudson Mfg. Co., Chicago, had a new hand cranked "Bantam" duster, just out, for the home gardener. Shown, too, was a typical selection of applicators from the 135 manual Hudson models and their 115 power sprayers and dusters. R. C. Hudson, Jr., was in charge★★

Danitra

Quality Controlled CUSTOM PACKAGING of WATER SOLUBLE FERTILIZERS

We are now scheduling the 1958 requirements of manufacturers and distributors of concentrated, high analysis, water soluble plant foods. To such organizations we can offer highly accurate formulating and packaging in units of one pound or more . . . with the economies of specialized operation and production line speed. We make shipments under customers labels and shipping tags.

Our experience in blending and formulating should be most helpful to manufacturers projecting new fertilizer products. Our people are available for consultation at our modern packaging plant, Metuchen, N. J.

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INCORPORATED
118 LIBERTY STREET NEW YORK 6, N. Y.

You pay less for this stronger thread for bags

"SUPER CORDURA" SEWING THREAD reduces bag breakage resulting from rugged handling, because seams are much stronger.

"SUPER CORDURA" can be sewn with smaller needles, preventing material losses caused by sifting.

HIGHLY EFFICIENT "SUPER CORDURA" REG. U. S. PAT. OFF.
REDUCES BAG AND CLOSING COSTS

GREATER seam strength, increased sewing efficiency, lower cost—these are the advantages of sewing bags with Du Pont "Super Cordura"* high tenacity rayon.

Because "Super Cordura" is far stronger than ordinary-fiber threads, danger of seam breakage is minimized—drop tests prove it. And because sewing with "Super Cordura" is more efficient, you save money in your closing operations. There are less breaks during closing; one thread does most jobs, reducing thread inventory.

Consider the advantages of bags sewn with Du Pont "Super Cordura" the next time you order multiwalls . . . and order it for use in closing, too.

E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Delaware.

*"Super Cordura" is Du Pont's registered trademark for its high tenacity rayon yarns.

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Better Things for Better Living . . . through Chemistry

THREAD OF "SUPER CORDURA"... easier to sew
... costs less than conventional thread ... extra-strong

SPRAY CONFERENCE

(*From Page* 83)

in Insecticides." These same insecticides are fairly safe to beneficial insects.

Mites have not as yet built up resistance to the selective miticides such as Aramite, Chlorobenzilate, Dimite, Kelthane, and Sulphenone, he added, pointing out that this latter group also is comparatively harmless to beneficial insects as well as to man and animals.

New year's annual Aerial Dusting and Spraying Conferences, tenth in the series, will be held late in October, 1958, in the Hotel Chinook, Yakima, Wash.★★

CONVEYOR SYSTEM

(*From Page* 37)

convenient height for lifting the bags to the truck bed.

Warren W. Price Jr., president of the Price Company, says that the conveyor system has released one-half of his truck loading crew for work in other sections of the plant while doubling his loading capacity. Fatigue has been eliminated as a problem in loading, and truck-waiting time is kept to a minimum, he said.★★

EMULSIONS

(*From Page* 39)

Many reactions at low temperatures are so slow that they can be disregarded in practice. But as temperatures are raised, more and more of these reactions are accelerated until they have a disrupting effect on the concentrate. A liquid concentrate may be quite stable at room temperature but its shelf life at 40° may be disconcertingly shortened. At temperatures of 60° and higher, concentrates which were exceptionally shelf-worthy at lower temperatures may deteriorate almost completely in a few days.

It becomes apparent then that a concentrate should be designed for a shelf life under conditions which will reflect those shorter storage periods at extremes of temperature.

(*To Be Concluded Next Month*)

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AEROSOL PESTICIDES

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Of paramount importance to him is the probable loss of milk production due to fly annoyance. Most dairy farmers have experienced milk losses during the fly season but many probably do not know how disastrous an uncontrolled fly problem can become.

A case in point was an overwhelming attack of so-called "dog flies," or stable flies, on several herds of dairy cattle in a southern state. Such was the fury of the attack that in order to protect their legs from the flies, hundreds of cattle sought the refuge of swampy waters, and many of them died after becoming mired in the mud, unable to free themselves. Among those that survived, there was an abrupt drop of 25 per cent in milk production, and at the height of the fly period, the reduction amounted to as much as half of the normal production of milk.

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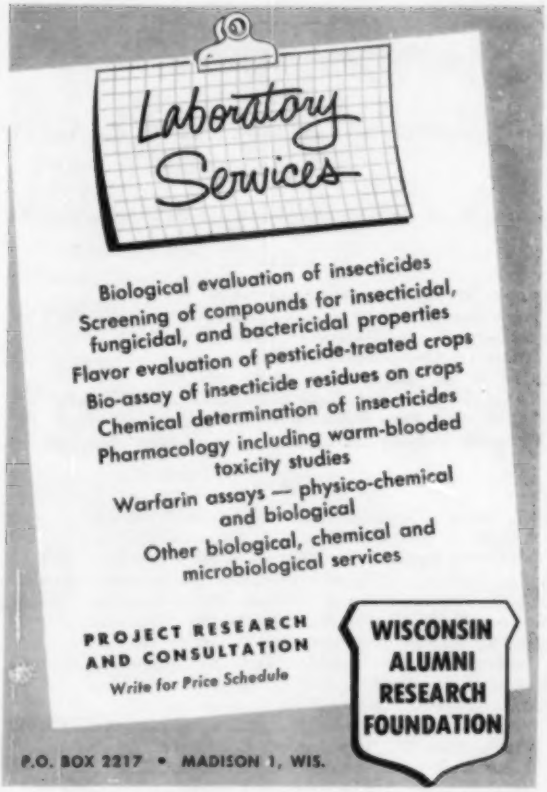
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The farmer also must overcome a fallacy in judgment that is becoming more and more rampant—that all of the flies on his farm are resistant to all insecticides. Investigations of combinations of pyrethrins and piperonyl butoxide deny this generalization.

The Illinois scientist, Dr. Bruce, noted in the yearbook of the U. S. Department of Agriculture (1952) that flies exposed to pyrethrins-butoxide combinations had no genuine resistance problem, even up to 30 generations of continuous exposure in the laboratory under conditions that are not likely to be encountered in practice. At the same time, it was demonstrated that considerable resistance developed after a few generations of exposure to the chlorinated insecticides. Furthermore, the work pointed out that strains of flies that had developed a tolerance for the chlorinated materials were still almost as susceptible to piperonyl butoxide-pyrethrins combination as "normal" flies. They seemed more robust and stronger than normal flies. In the long use of pyrethrins no one has ever reported a strain of flies resistant to pyrethrins in nature.

Resistant flies are a constant problem, of course. This quirk of nature probably is responsible for the fact that the old fashioned fly baits and sticky fly-papers are coming back More than 100 companies are back in the business of manufacturing fly papers, also there are a number of baits that are exposed on the floors of barns for poisoning the flies.

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Conditional Approval To ET-57

Provisional approval of ET-57, a systemic insecticide for the control of cattle grubs, will enable industry to provide for limited use of the chemical by cattlemen this fall in certain areas of several midwestern States, according to a recent USDA announcement.

Registration of the new product by USDA, with the concurrence of the Food and Drug Administration, represents an acknowledgment that research has progressed far enough to warrant large-scale use of the pesticide in limited areas for cattle-grub control.

The basic material — described chemically as O, O-dimethyl-o-2,4,5-trichlorophenyl phosphorothiate— will be available primarily in certain areas of Iowa, Nebraska, South Dakota, and Wyoming. Generally designated "ET-57", the product will be marketed under trade names of several companies.

Owens-Illinois Introduces New Type Multiwall Bag

A new type of multiwall paper bag has been developed by the Multiwall Bag Division of the Owens - Illinois Glass Co., Toledo, Ohio, in cooperation with the Wyandotte Chemicals Corp., Wyandotte, Michigan.

The main feature of the new bag is a pasted valve reducing insert that permits standardization of pallet patterns regardless of the density of the packaged product. The valve reducing insert now makes it possible for Owens-Illinois to make a bag of standard length and width—but with a thickness when filled that may range anywhere from 3½ inches up to 6½ inches.

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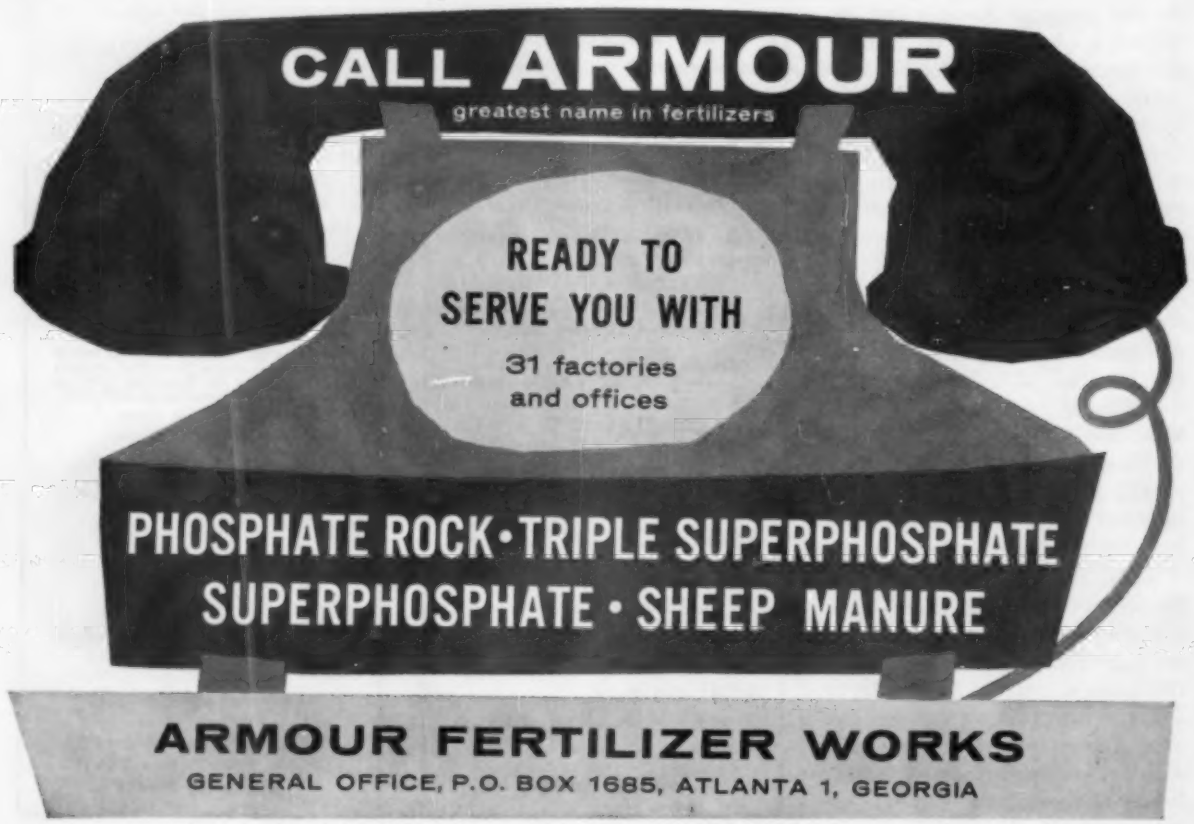

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Climax Tells Merger Plans

The Climax Molybdenum Co., New York, last month announced plans for a merger with the American Metal Co., Ltd., a leading custom smelter and refiner of ores and scrap in this country.

FERTILIZER SOL'NS. ASSN.

(*From Page 42*)

be a hazard to use it on other crops later in the season or the following season? Will the use of this combination cause any trouble in application or with your equipment by reacting with metal, hoses, gaskets, etc? Would seed treatment or some other method of application of the pesticide be more economical and possibly more effective? Should the pesticide be cultivated into the soil after treatment or should it be left untouched on the surface and how does this go with your fertilizer application method?

Mr. Hamsher suggested that it would probably be most satisfactory to mix the pesticide with the fertilizer solution just prior to application, as plant mixing of pesticides with fertilizer solutions is not practical with materials now available.

He ended his comments with the observation that the user of a combination pesticide-fertilizer mixture should "expect no more from the combined application than you would get from separate applications of the materials. You may even have to give up something in control or nutrition."

Dr. E. J. Haertl, Dow Chemical Co., Midland, Mich., took Chelating Agents as his topic, telling what they are and what they may be expected to do in fertilizer solutions. He indicated that chelating agents are "naturals" for liquid fertilizer use, and should be even more important for use in fertilizer solutions than in fertilizers. It is difficult to get an adequate content of essential trace nutrient elements in liquids, but the addition of the chelating agent serves to make the smaller metal content more effective. The addition of the chelate enables an organic compound to tie on to a metallic ion, making it soluble and so available to growing plants. His talk was illustrated with a series of slides which showed the dramatic response of a number of crops, including citrus, to chelating agents, rapidly remedying the effects of mineral deficiency symptoms.

Dr. Edwin F. Alder of Lilly Research Laboratories, discussed Gibberellic Acid.

"The convenient spray application of gibberellic acid to foliage," he observed, "might fit rather well into certain types of solution fertilizer programs. There are some limitations to application in this manner. First, gibberellic acid in its present form tends to decompose in aqueous solutions at room temperatures. Thus it would be impossible to store the material in fertilizer solutions. The gibberellic acid would have to be added just prior to fertilizer application. Second, the reported inactivation of gibberellic acid in soil makes it unlikely that a gibberellic acid additive in fertilizer solutions for treatment of soil can be used. Only fertilizer solutions which are to be, at least in part, sprayed on or very near plants would be suitable subjects for gibberellic acid addition," he concluded.

Study Application Rates at Oregon Weed Conference

EXISTENCE of a fine line between beneficial and harmful rates of application of various herbicides was brought out by various speakers at the sixth annual Oregon Weed Conference held November 14 and 15 at Oregon State College, Corvallis. Approximately 300 persons heard college experts, industry representatives, farmers, and spray applicators discuss the newest weed killers available for trials and general use.

Disappointing results from Simazin at 1 and 2 pounds per acre in sweet corn were ascribed to Oregon farmers' tendency to delay irrigation until after the crop has attained considerable growth. Previously Vernon W. Olney, Fresno, Calif., in charge of research for Geigy Agricultural Chemicals in all the area west of the Rockies, had reported up to 80% increase in yield in corn where Simazin had been used. He also told of a marked increase in fern growth of asparagus when the chemical was used after harvest in trials in the Yakima Valley in Washington.

California does not use herbicides as intensively in agriculture as Oregon does, Jack Fisher, Seattle, Wash., of Dow Chemical Company, declared in his talk, "How Your Neighbors Control Weeds in Vegetables."

Diuron in two sprays (spring and fall) at 2 pounds per acre each, controls most weeds in caneberry fields, R. M. Bullock, superintendent of the Southwest Washington Experiment Station, Vancouver, reported. Addition of ½ pound of 2,4-D to the fall spray helps keep down some of the more difficult ones.

"Once you get rid of the perennial weeds, you can treat them as annuals in the future," he pointed out. Quack grass and Canadian thistle can be spot sprayed with amino triazole. Reduction of the huge reservoir of weed seeds following several years of chemical treatment should make possible satisfactory weed control with a single spray annually.

Soil moisture is the critical factor in satisfactory results with Diuron. No attempt is made to keep the material from the canes, because a slight yellowing of the tips clears up in 10 days to two weeks.

Sessone at 3 pounds per acre can be used all through the season on strawberry fields, he added, with some-what lighter applications possible on lighter soils. This material works only on germinating seeds, so "if you can see the weeds, it's too late," he commented. Applied just before or after a rain or irrigation, it does an effective job over a month to six-week period.

Other experimental materials on which he would make no recommendations, but which "looked promising," included Natrin, 3-Y-9 (both liquid and granular), Randox, and Neburon, which is a urea product. Neburon at 3 pounds per acre, applied two weeks after strawberry plants are set out, kept weeds down all summer.

The possibility that Simazin may solve the weed control problem in the expansive Columbia Basin wheat-pea rotation was expressed by William Furtick, Oregon State College farm crops specialist, who pointed out that peas ranked next to corn in tolerance of the chemical. Development of a short, stiff-stemmed wheat which can take more nitrogen, boosting yields, has been accompanied by increased growth of weeds that fouled combines and made their control more imperative.

Quack grass can be controlled by application of 10 pounds of Dalapon per acre, or by spot spraying with 1 pound Dalapon in 5 to 10 gallons of water, Fisher declared. He suggested 1 to 1½ pounds of amine 2,4-D, sprayed under a canvas cover, to control morning glory in beans.

Monuron at 1 pound per acre can be used safely on spinach, but adversely affects tomatoes which follow in the California rotation, he declared.

Need for additional research to obtain answers to a great many unsolved questions was pointed out by several speakers, including Virgil Freed, Oregon State College experiment station associate chemist, who voiced the opinion that herbicides follow certain basic laws in their actions. Information obtained in basic research would help agricultural chemists in developing more potent weed-killers, he pointed out.

Monsanto's 6936 (a derivative of Randox), as well as EPTC have shown promise in controlling weeds in sugar beets, Harry Mack, Oregon State College instructor in horticulture, reported. However, no statistically significant results were obtained from EPTC at 4 and 8 pounds per acre, nor with 6936 in yields obtained on table beets, although weed control was good.

Weed control obtained with dinitro amine at 3 pounds per acre; the same material combined with 4 pounds of Vegedex, and EPTC at 4 and 8 pounds per acre were similar, as was the yield of pole beans in the tests the same speaker conducted. He also reported that the yield of sweet corn was 6¾ tons per acre when Simazin was used at 2 and 4 pound rates. Weed control was 95% when the heavier rate was used.

The same results were obtained with dinitro amine, but the field was also cultivated, he commented.★★

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Study Phosphorus Source

The nation's largest, but as yet undeveloped, deposit of phosphate rock was inspected recently by Governor George D. Clyde of Utah, officials of the Federal Bureau of Reclamation, and executives of Stauffer Chemical Company, Western Phosphates Inc., Mountain Copper Company, Ltd., and San Francisco Chemical Company. It is anticipated that the deposit may become a major source of phosphorous within the next few years and particularly so when the Flaming Gorge Dam, now under construction, is completed.

San Francisco Chemical Company, jointly owned by Stauffer and Mountain Copper Company, Ltd., holds exclusive rights to the huge deposit, which covers some 15,000 acres. Indicated phosphate rock reserves, averaging 21 per cent P_2O_5, approximate 700 million tons.

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TALE ENDS

SOME one is always coming up with the idea of fertilizing the ocean as a means of increasing the world's food supply. Latest to advance this suggestion is Dr. S. Granick of the Rockefeller Institute for Medical Research. In the course of a recent 3-day conference on trace elements held at the Ohio Agricultural Experiment Station he suggested that the ocean's harvest of fish might be increased by applications of soluble iron, in which sea water is deficient. These suggestions always put us in mind of Aesop's famous query as to "who is going to bell the cat." However we think we know the answer to this one. Who but opulent and gullible old Uncle Sugar would be soft enough to foot this bill? Now, if they were talking about using some of our excess nitrogen or potash, there might be some support from fertilizer raw material suppliers for such a proposal.

AC

Attention handicappers: Readers of this column were alerted a year or so ago to the fact that Paul Mayfield, Hercules Powder's VP and past president of the NACA, was preparing to make a contribution to the "improvement of the breed" this season. His two-year old colt, Mike's Treat, was a little late getting to the races, but finally made his initial start at Jamaica early in November. After several unsuccessful efforts, which among other things helped to build up a very attractive price, he bounced down on November 25th in a mile and sixteenth tussle, paying a handsome $59.30 for the $2 investment.

AC

The people who are marketing that much-publicized bat guano from the Grand Canyon are to be congratulated on having the best publicity man around the fertilizer industry. The story was used quite widely back six or eight months ago when AC first carried an item (May '57 issue, pg. no. 85). Then in its issue of Nov. 11, LIFE *went for a second installment, this time complete with a couple pages of pictures. And what really rung the bill with us, hardened as we are to the blandishments of PR men as they try to wangle editorial space for their commercial clients, was that this particular operator succeeded in getting* LIFE *to print the prices — five pound sacks for a buck ten, and the giant economy twenty-five pound bag for only $3.70. If there were an award for PR man of the year, this guy should win it.*

AC

Ernie Hart, president of Food Machinery and well remembered by members of the insecticide industry as president of NACA a few years back, broke into print on the press wires last month with a talk at a Los Angeles Rotary Club luncheon. He classified as "applesauce" Russian boasts of an impending rocket trip to the moon.

AC

To portray "the shape of things to come," Simplicity Mfg. Co., Port Washington, Wis., showed a model of a multipurpose machine, at the garden show in Chicago (story on p. 51). Complete with plastic bubble top dome cab for allweather protection of the driver, the company claims, the car can be driven along the highway in addition to performing a host of chores about the yard. It will "mow the lawn," says a company statement, "weed it, seed it, feed it, spray for insects, plow snow, haul equipment and provide power take off for lights, radio-telephone or air conditioning and cooling. It can even be used as a golf cart."

This "Wonder Boy X-100" is not in production yet.

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After three years of extensive field tests, Delnav—a new phosphate pesticide—will be commercially available in limited quantities this year.

With indicated effectiveness in controlling a wide range of crop pests, this unusually long-lasting pesticide has already been recommended by various state authorities for use on cotton. Test results have also demonstrated the usefulness of Delnav on citrus and deciduous fruits, grapes, vegetables, and ornamentals as well as control of cattle ticks.

Developed at Hercules' Research Center and Agricultural Chemicals Laboratories, Delnav has been evaluated by Hercules, the United States Department of Agriculture, and various state agricultural research laboratories. Among the insects it controls are leafhoppers, thrips, leaf miners, and mites of various types. The effectiveness of Delnav is shown by the fact that it not only destroys adults but also the eggs of mites.

Delnav will be available in dusts or sprays in the near future. Additional information on this new product can be obtained by writing to Hercules.

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